STATEMENT OF BASIS
Remedial Rule Authorization
Change In Operations
Former Building 1211 site
Area 169
Fort Carson, Colorado
EPA # CO 50000-08668

Bacground

The site was once used for 8 dispenser pumps and underground storage tanks Following the discovery of contamination consisting of DCE, benzene, 1,2 dichloroethane and other associated volatile petroleum hydrocarbons, the tanks and contaminated soil were removed and the excavation was backfilled with coarse material, The former tank basin was excavated to 14 feet below ground surface (bgs). The US Army has contracted with Shaw Environmental, Inc. to complete the decontamination of the groundwater in accordance with an accepted Corrective Action Plan. The EPA Class V Program authorized injection of 11.8% sodium persulfate on November 18, 2009. On July 18, 2012, Shaw Environmental applied for a Change In Operations to inject more sodium persulfate activated with sodium hydroxide into 25 new direct push injection wells. That application was approved on August 30, 2012. Due to low permeability, the treatment was not completely successful. The target aquifer did not accept the calculated quantity of injectate required for decontamination. Consequently, Shaw applied for a second Change In Operations proposing to inject a pure food carbon source and selected bacterial amendments to further degrade the chlorinated hydrocarbons that are still present as well as more sodium persulfate and hydrogen peroxide using larger diameter and closer spaced wells.

The decontamination work at this specific site continues to be conducted under the supervision by the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment.

Location

The location within the Fort Carson military reservation is shown on the Google map attached hereto. Building 1211 is on the northeast corner for the Chiles Avenue and Evans Street intersection. For convenience sake, the building has been colored red. The figures included with the application show the location of the former tank basin and the proposed injection sites. The contamination has also been detected south of Evans Street which is the reason for the proposed bioremediation wells in that area. See Figure 5.

Geology & Hydrology

The alluvium at this site consists of fine grained silt and clay and extends from the surface to the top of the Pierre Shale whose weathered surface occurs at between 3 and 14 feet bgs. The site also includes excavation fill which is composed of coarse sand and gravel. As previously stated, the shallow groundwater occurs between 4.6 to 13.7 feet bgs and moves northeasterly as shown on Figure 4. The movement of contaminants south of Evans Street suggests a southerly component to ground water flow as well.

Proposed Program

Shaw Environmental proposes to inject at the 20 new locations in the tank basin area, and south of Evans Street as shown on Figure 2, using 4 inch wells with packers instead of direct push methods. The injectate will again be sodium persulfate activated with sodium hydroxide. The new wells will be closer spaced than the previous wells. As before, the pesulfate will be diluted with potable water to about 11.8% by weight. The Change In Operations request includes the injection of vegetable oil and sodium lactate with selected bacteria to be injected into eleven 4 inch wells located south of Evans Street as shown on Figure 5. Injection depth will be in the saturated zone between 11 and 16 feet bgs.

Other Water Users

The Department of the Army owns all of the surrounding area. The only nearby wells are monitoring wells or wells not used for domestic purposes. Therefore, the proposed remedial activities will not affect any other shallow groundwater users.

Recommendation

This remedial work is being performed under the supervision of the Colorado Department of Public Health and Environment, Division of Hazardous Materials and Waste Management. Since the work can be performed without further endangering human health or groundwater, a rule authorization to proceed as proposed is recommended.

STATEMENT OF BASIS
Remedial Rule Authorization
Change In Operations
Former Building 1211 site
Area 169
Fort Carson, Colorado
EPA # CO 50000-08668
(correction)

Summary

The Rule Authorization for this site dated January 7, 2013 contained an error. The letter authorized injections of sodium persulfate and hydrogen peroxide. The intended injectate should have been sodium persulfate and sodium peroxide. The letter attached makes corrects the error.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 WYNKOOP STREET
DENVER, CO 80202-1129
http://www.epa.gov/region8

NOV 18 2009

Ref: 8P-W-GW

Carlos Rivero-deAguilar
Fort Carson Department of the Army
1628 Elwell Street, Bldg 6236
Fort Carson, CO 80913-4356

RE: CLASS V UIC PROGRAM
Rule Authorization: Aquifer Remediation Well
Fort Carson Former Bldg 1211
Buiilding 1203
Fort Carson, CO
EPA File #CO50000 - 08668

Dear Carlos Rivero-deAguilar:

The U.S. Environmental Protection Agency's (EPA's) Underground Injection Control (UIC) Program staff has reviewed the application that was submitted by you or on your behalf for the Class V aquifer remediation injection well(s) at the above referenced location. Based on our understanding of the proposed program and limited potential for groundwater contamination, we have determined that a permit is not necessary at this time. Therefore, your aquifer remediation injection well(s) is currently "authorized by rule" in accordance with Title 40 Code of Federal Regulations (40 CFR) Sections 144.24 and 144.84(a). This authorization is based on information provided in your application and is valid for:

injections of a 12% sodium persulfate and sodium hydroxide mixed with potable water into 12 direct push injection wells,

and is limited to the location(s) indicated in the application that we received on October 21, 2009.

All injection wells are regulated under the UIC Program in accordance with 40 CFR Parts 144 and 146, which have been promulgated under Part C of the Safe Drinking Water Act, 42 United States Code Sections 1421 through 1428. Your Class V injection well(s) is subject to periodic compliance inspections, which may include sampling and analysis of your fluids. Finally, be aware that under 40 CFR Sections144.12(c), (d), and (e), the EPA can require you to apply for a permit or close your injection well(s) under certain circumstances.

UIC Class V File				
UIC PERMIT & ID #:_____				
Invent. Form	Inspect. Rep.	Monit. Reports	EPA Corres.	Operator Corres.

Please notify us if the potential for groundwater contamination increases. If you intend to change the proposed plan, please notify us in advance. Any changes in operating methods or any other conditions that may adversely impact groundwater MUST be approved in advance by the EPA. Failure to comply with the above requirements will result in violations of UIC regulations and possible enforcement actions and penalties.

Please be advised that this rule authorization pertains solely to the UIC Program and does NOT relieve you from satisfying any other federal, state, or local regulations that may apply.

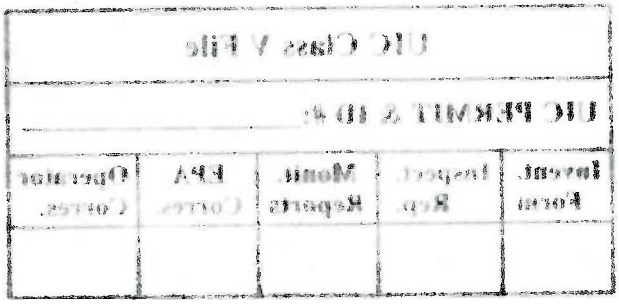
Please complete and return the self-addressed, stamped postcard included with this letter. Please contact Howard Urband at 1-800-227-8917, extension 312-6135 or (303) 312-6135, if you have any questions or need more information. More information on the EPA Region 8 Class V program can also be found online at: http://www.epa.gov/region8/water/uic/r8cvprog.html.

Sincerely,

Steven J. Pratt, PE, CAPM (inactive)
Director, Groundwater Program

Enclosure: Self-addressed, Stamped Postcard (please return with signature and date)

cc: Ms. Deb Anderson
Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, CO 80246-1530



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 WYNKOOP STREET
DENVER, CO 80202-1129
http://www.epa.gov/region8

AUG 30 2012

Ref: 8P-W-UIC

Carlos Rivero-deAguilar
Fort Carson Department of the Army
1626 Evans Street, Building 1219, Room 231
Fort Carson, CO 80913-4356

RE: CLASS V UIC PROGRAM
Rule Authorization: Aquifer Remediation Well
Change in Operations
Fort Carson Former Bldg 1211
Chiles Avenue and Evans Street
Fort Carson, CO
EPA File #CO50000 - 08668

Dear Carlos Rivero-deAguilar:

The U.S. Environmental Protection Agency's (EPA's) Underground Injection Control (UIC) Program staff has reviewed the application that was submitted by you or on your behalf for the Class V aquifer remediation injection well(s) at the above referenced location. Based on our understanding of the proposed program and limited potential for groundwater contamination, we have determined that a permit is not necessary at this time. Therefore, the change(s) proposed is currently "authorized by rule" in accordance with Title 40 Code of Federal Regulations (40 CFR) Sections 144.24 and 144.84(a). This authorization is based on information provided in your application and is valid for:

additional injections of sodium persulfate activated with sodium hydroxide in 25 new direct push injection wells,

and is limited to the location(s) indicated in the application that we received on July 18, 2012.

All injection wells are regulated under the UIC Program in accordance with 40 CFR Parts 144 and 146, which have been promulgated under Part C of the Safe Drinking Water Act, 42 United States Code Sections 1421 through 1428. Your Class V injection well(s) is subject to periodic compliance inspections, which may include sampling and analysis of your fluids. Finally, be aware that under 40 CFR Sections144.12(c), (d), and (e), the EPA can require you to apply for a permit or close your injection well(s) under certain circumstances.

Please notify us if the potential for groundwater contamination increases. If you intend to change the proposed plan, please notify us in advance. Any changes in operating methods or any other conditions that may adversely impact groundwater MUST be approved in advance by the EPA. Failure to comply with the above requirements will result in violations of UIC regulations and possible enforcement actions and penalties.

Please be advised that this rule authorization, change in operations pertains solely to the UIC Program and does NOT relieve you from satisfying any other federal, state, or local regulations that may apply.

Please complete and return the self-addressed, stamped postcard included with this letter. Please contact Howard Urband at 1-800-227-8917, extension 312-6135 or (303) 312-6135, if you have any questions or need more information. More information on the EPA Region 8 Class V program can also be found online at: http://www.epa.gov/region8/water/uic/r8cvprog.html.

Sincerely,

Steven J. Pratt, PE, CAPM (inactive)
UIC Unit Chief

Enclosure: Self-addressed, Stamped Postcard (please return with signature and date)

cc: Mr. Harold Noonan, Water Programs Manager
Department of the Army
1626 Evans Street, Building 1219, Room 217
Fort Carson, Colorado 80913

Ms. Deb Anderson
Colorado Department of Public Health and Environment
HMWMD-B2
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 WYNKOOP STREET
DENVER, CO 80202-1129
http://www.epa.gov/region8

JAN 17 2013

Ref: 8P-W-UIC

Carlos Rivero-deAguilar
Fort Carson Department of the Army, Directorate of
Public Works
1626 Evans Street, Building 1219, Room 231
Fort Carson, CO 80913-4356

RE: CLASS V UIC PROGRAM
Rule Authorization: Aquifer Remediation Well
Change in Operations
Fort Carson Former Bldg 1211
Chiles Avenue and Evans Street
Fort Carson, CO
EPA File #CO50000 - 08668

Dear Carlos Rivero-deAguilar:

The U.S. Environmental Protection Agency's (EPA's) Underground Injection Control (UIC) Program staff has reviewed the application that was submitted by you or on your behalf for the Class V aquifer remediation injection well(s) at the above referenced location. Based on our understanding of the proposed program and limited potential for groundwater contamination, we have determined that a permit is not necessary at this time. Therefore, the change(s) proposed is currently "authorized by rule" in accordance with Title 40 Code of Federal Regulations (40 CFR) Sections 144.24 and 144.84(a). This authorization is based on information provided in your application and is valid for:

> additonal injections of sodium persulfate and sodium peroxide plus injections of vegetable oil with selected bioaugmentation cultures in the manner described in your application,

and is limited to the location(s) indicated in the application that we received on December 5, 2012.

All injection wells are regulated under the UIC Program in accordance with 40 CFR Parts 144 and 146, which have been promulgated under Part C of the Safe Drinking Water Act, 42 United States Code Sections 1421 through 1428. Your Class V injection well(s) is subject to periodic compliance inspections, which may include sampling and analysis of your fluids. Finally, be aware that under 40 CFR Sections144.12(c), (d), and (e), the EPA can require you to apply for a permit or close your injection well(s) under certain circumstances.

Please notify us if the potential for groundwater contamination increases. If you intend to change the proposed plan, please notify us in advance. Any changes in operating methods or any other conditions that may adversely impact groundwater MUST be approved in advance by the EPA. Failure to comply with the above requirements will result in violations of UIC regulations and possible enforcement actions and penalties.

Please be advised that this rule authorization, change in operations pertains solely to the UIC Program and does NOT relieve you from satisfying any other federal, state, or local regulations that may apply.

Please complete and return the self-addressed, stamped postcard included with this letter. Please contact Howard Urband at 1-800-227-8917, extension 312-6135 or (303) 312-6135, if you have any questions or need more information. More information on the EPA Region 8 Class V program can also be found online at: http://www.epa.gov/region8/water/uic/r8cvprog.html.

Sincerely,

Steven J. Pratt, PE, CAPM (inactive)
UIC Unit Chief

Enclosure: Self-addressed, Stamped Postcard (please return with signature and date)

cc: Mr. John Chinnock, P.E.
Shaw Environmental, Inc.
9201 East Dry Creek Road
Centennial, Colorado 80112

Ms. Deb Anderson
Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 WYNKOOP STREET
DENVER, CO 80202-1129
http://www.epa.gov/region8

JAN 07 2013

Ref: 8P-W-UIC

Carlos Rivero-deAguilar
Fort Carson Department of the Army
1626 Evans Street, Building 1219, Room 231
Fort Carson, CO 80913-4356

RE: CLASS V UIC PROGRAM
Rule Authorization: Aquifer Remediation Well
Change in Operations
Fort Carson Former Bldg 1211
Chiles Avenue and Evans Street
Fort Carson, CO
EPA File #CO50000 - 08668

Dear Carlos Rivero-deAguilar:

The U.S. Environmental Protection Agency's (EPA's) Underground Injection Control (UIC) Program staff has reviewed the application that was submitted by you or on your behalf for the Class V aquifer remediation injection well(s) at the above referenced location. Based on our understanding of the proposed program and limited potential for groundwater contamination, we have determined that a permit is not necessary at this time. Therefore, the change(s) proposed is currently "authorized by rule" in accordance with Title 40 Code of Federal Regulations (40 CFR) Sections 144.24 and 144.84(a). This authorization is based on information provided in your application and is valid for:

> additional injections of sodium persulfate and hydrogen peroxide plus injections of vegetable oil with selected bioaugmentation cultures in the manner described in your application,

and is limited to the location(s) indicated in the application that we received on December 5, 2012.

All injection wells are regulated under the UIC Program in accordance with 40 CFR Parts 144 and 146, which have been promulgated under Part C of the Safe Drinking Water Act, 42 United States Code Sections 1421 through 1428. Your Class V injection well(s) is subject to periodic compliance inspections, which may include sampling and analysis of your fluids. Finally, be aware that under 40 CFR Sections144.12(c), (d), and (e), the EPA can require you to apply for a permit or close your injection well(s) under certain circumstances.

Please notify us if the potential for groundwater contamination increases. If you intend to change the proposed plan, please notify us in advance. Any changes in operating methods or any other conditions that may adversely impact groundwater MUST be approved in advance by the EPA. Failure to comply with the above requirements will result in violations of UIC regulations and possible enforcement actions and penalties.

Please be advised that this rule authorization, change in operations pertains solely to the UIC Program and does NOT relieve you from satisfying any other federal, state, or local regulations that may apply.

Please complete and return the self-addressed, stamped postcard included with this letter. Please contact Howard Urband at 1-800-227-8917, extension 312-6135 or (303) 312-6135, if you have any questions or need more information. More information on the EPA Region 8 Class V program can also be found online at: http://www.epa.gov/region8/water/uic/r8cvprog.html.

Sincerely,

for Steven J. Pratt, PE, CAPM (inactive)
UIC Unit Chief

Enclosure: Self-addressed, Stamped Postcard (please return with signature and date)

cc: Mr. John Chinnock, P.E.
Shaw Environmental, Inc.
9201 East Dry Creek Road
Centennial, Colorado 80112

Ms. Deb Anderson
Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Shaw®
a world of Solutions™

December 4, 2012

DEC 05 2012

Mr. Craig Boomgaard
EPA Region 8
8P-W-UIC
1595 Wynkoop Street
Denver, CO 80202-1129

UIC Class V File						
UIC Permit #: CO J0000 - 08668						
Permit	Inv Form	Inspec Report	Monitor Report	EPA Corresp	Operator Corresp	State Corresp
					X	

cc: Mona Douillard—Army
Melissa Kemling—USACE
James Tiehen—USACE
Terry Samson—USACE
Matt Dayoc—USAEC
Deb Anderson—CDPHE
Roland Clubb—CDPHE
File

Subject: Underground Injection Control Authorization Request, Former Building 1211 Underground Storage Tank (FTC-088/SWMU 169), Fort Carson, Colorado

Shaw Tracking No.: SHAW-FTC-0493

Dear Mr. Boomgaard:

Shaw Environmental, Inc. (Shaw) on behalf of the Fort Carson Military Installation (Ft. Carson), as authorized by the Colorado Department of Public Health and Environment (CDPHE) Hazardous Materials and Waste Management Division, is transmitting one copy of the *Draft Final Remedy Modification Request* to satisfy the information requirements for obtaining a Class V Underground Injection Control (UIC) rule authorization for the Former Building 1211 Underground Storage Tank (Fort Carson Site Number-088/Solid Waste Management Unit [SWMU] 169), Fort Carson, Colorado.

The Remedy Modification Request provided for your review contains the details of the proposed injection event at the SWMU 169 site. The injection of emulsified vegetable oil (EVO), sodium lactate, and a microbial dechlorinating consortium (SDC-9™) able to reduce chlorinated ethenes is planned using eleven groundwater wells screened 11 to 16 feet below ground surface to target the contaminated groundwater zone. The eleven 4-inch, schedule 40 injection wells, will be installed specifically for this injection and are scheduled to be installed the week of December 10th, 2012. The injections are intended to remediate 1,2-dichloroethane (1,2-DCA) in groundwater via in situ enhanced bioremediation (ISEB) at SWMU 169. The injection activities are tentatively scheduled to commence in January 2013. The carbon source injection is estimated to take 2 days. Then, approximately 2 months after delivering the carbon amendment and the groundwater has become favorable for the anaerobic injection of the SDC-9™ consortium, it is estimated 1 day of injection will be required. Wells within

9201 E. DRY CREEK ROAD, CENTENNIAL, CO 80112
303.741.7700 • FAX 303.741.7670

1 mile of this injection site are all located on Ft. Carson property and are primarily used for groundwater monitoring. No wells within 1 mile of the site are used for potable water. To facilitate your review, the pertinent information as it applies to the UIC rule authorization is highlighted in the attached Remedy Modification Request.

The following is a list of contact information outlined in the EPA *Site Information Request Fact Sheet, Class V Underground Injection Control.*

Property owner:
Department of the Army Mr. Carlos Rivero-de Aguilar
United States Army Installation Management Command
Headquarters, United States Army Garrison, Fort Carson
1626 Evans Street, Bldg 1219
Fort Carson, Colorado 80913-4362
P: 719.526.1241
F: 719.526.2120

Operator of facility:
Department of the Army
United States Army Installation Management Command
Headquarters, United States Army Garrison, Fort Carson
1626 Evans Street, Bldg 1219
Fort Carson, Colorado 80913-4362
P: 719.526.1241
F: 719.526.2120

Responsible party for the operation, maintenance, and closure of the injection system:
Shaw Environmental, Inc.
Project Manager
John Chinnock, P.E., PMP
9201 E. Dry Creek Road
Centennial, CO 80112
P: 720.554.8160
F: 720.554.8298

Shaw Construction Field Manager:
Jon Kaibel
9246 Butts Road (Route 5)
(Delivery Only)
Fort Carson, Colorado 80913
P: 719.330.6463

State Agency authorizing site clean up:
Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
Ms. Deb Anderson
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530
P: 303.692.3379

If you have any questions or require additional information, please contact me at (720) 554-8160.

Sincerely,

John Chinnock

John Chinnock, P.E., PMP
Project Manager
Shaw Environmental, Inc.

Shaw®
a world of Solutions™

March 8, 2012

Mr. Carlos Rivero-deAguilar
Department of the Army
Directorate of Public Works, Environmental Division
Attn: ECT Program Leader
1626 Evans Street, Bldg 1219
Fort Carson, Colorado 80913-4362

cc: Mona Douillard, Army
Rebekah Allen, Army
Melissa Kemling, USACE
James Tiehen, USACE
Terry Sampson, Army
Matt Dayoc, AEC
Meeckral Williams, AEC
Gary Parks, Shaw

Subject: Draft Final Remedy Modification Request, Former Building 1211 Underground Storage Tank (FTC-088/SWMU 169), Fort Carson, Colorado

Shaw Tracking No.: SHAW-FTC-370

Dear Mr. Rivero-deAguilar:

In August 2009, Fort Carson submitted the *Final Presumptive Remedy Work Plan, Former Building 1211 Underground Storage Tank (FTC-088/SWMU 169), Fort Carson, Colorado* (PRWP) (Shaw Environmental, Inc. [Shaw], 2009). The PRWP was approved by the Colorado Department of Public Health and Environment (CDPHE) in a letter dated September 9, 2009, and implementation of the remedy selected in the PRWP commenced in October 2009. To date, however, the selected remedy has not fully achieved project objectives. Therefore, Shaw is submitting this Remedy Modification Request.

Currently, there are two distinct treatment areas within Solid Waste Management Unit (SWMU) 169. The first treatment area is located within and around the former underground storage tank (UST) pits. The second treatment area is located south of the former tank pits and south of Evans Street.

Within the first treatment area, chemicals of concern (COCs) identified in the PRWP and the *Resource Conservation and Recovery Act Hazardous Waste Part B Permit No. CO-06-09-29-01* (Part B Permit) (CDPHE, 2006) as requiring remediation include the polycyclic aromatic hydrocarbons (PAHs) benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene in soil, and, the PAHs bis(2-ethylhexyl)phthalate, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3-cd)pyrene in groundwater. Additionally, the volatile organic compounds (VOCs) benzene and vinyl chloride in

9201 E. DRY CREEK ROAD, CENTENNIAL, CO 80112
617.589.1043 • FAX 617.589.2992

groundwater also require remediation. In the second treatment area, the COC requiring remediation is limited to 1,2-dichloroethane (1,2-DCA) in groundwater.

In both treatment areas, the PRWP called for remediation by in situ chemical oxidation (ISCO) using sodium persulfate activated by sodium hydroxide to treat COCs exceeding the cleanup goals identified in the Part B Permit. ISCO is planned to continue as the remedy for the treatment of the PAHs in soil and groundwater and benzene and vinyl chloride in groundwater in the first treatment area surrounding the former UST pits. A second application of ISCO is planned for this treatment area during the second quarter of 2012. However, Shaw intends to change the "method of delivery" of the reagent into the subsurface environment. In a call with the CDPHE on January 27, 2012, it was confirmed that a permit modification would not be required to alter the delivery method.

Conversely, Shaw is proposing to change the currently stipulated ISCO remedy in the Part B Permit for the second treatment area. Shaw is proposing to replace the current ISCO treatment with in situ enhanced bioremediation (ISEB) as the remedy for 1,2-DCA in groundwater in the second treatment area. The modification is designed to be protective of human health and the environment, attain cleanup levels, and meet all waste management requirements. A change to the currently specified remedy in the Part B Permit will require a permit modification. The purpose of this letter is to facilitate that modification.

Background

SWMU 169 is located in the northern portion of the Cantonment Area at Fort Carson, as shown in **Figure 1**. Former Building 1211 served as a pump house for a fueling station, which consisted of one 12,000-gallon diesel UST, one 12,000-gallon solvent UST, eight diesel fuel–dispensing pumps, and one solvent-dispensing pump. The removal of the Building 1211 USTs was conducted sometime between 1986 and 1988 (Earth Tech, Inc. [Earth Tech], 2008). The site is currently used as an asphalt-paved parking lot and grass-covered area associated with Building 1203. The previous investigations concluded that the origin of organic compounds in the groundwater and petroleum hydrocarbon compounds in soil may be associated with former fueling station activities (Earth Tech, 2008).

Additional background information and operational history of SWMU 169 are contained in the PRWP.

Presumptive Remedy Implementation Summary

ISCO and follow-up direct-push technology (DPT) sampling of soils in the UST excavation pits were selected as the presumptive remedy for SWMU 169. ISCO treatment at SWMU 169 consisted of the application of sodium persulfate activated by sodium hydroxide to treat the COCs in both soil and groundwater. A complete summary of the presumptive remedy activities conducted at SWMU 169 is included in the *Presumptive Remedy Annual Progress Report for 2010, Former Building 1211 Underground Storage Tank (FTC-088/SWMU 169), Fort Carson, CO* (Shaw, 2010) and the *Presumptive Remedy Annual Progress Report for 2011, Former Building 1211 Underground Storage Tank (FTC-088/SWMU 169), Fort Carson, CO* (Shaw, 2011) and consisted of the following:

- The installation of six additional compliance monitoring wells (1206MW01A, 1206MW09, 1206MW10, 1206MW11, 1206MW12, and 1206MW13) in October 2009 (**Figure 2**)
- A soil oxidant demand test conducted in October 2009
- Development of the six new compliance wells conducted in October and November 2009

telephone call on January 27, 2012. This letter report describes a planned modification to the remedy for the treatment of 1,2-DCA in groundwater.

The basis for a change to the 1,2-DCA remedy is primarily due to the low permeability conditions in the 1,2-DCA treatment area in the vicinity of wells 1206MW10 and 1206MW11. As mentioned previously, actual oxidant volumes injected within this treatment area were significantly less than the target volumes. A change from DPT injection locations to large diameter injection wells combined with the use of lower quantities of biological amendments and substrates results in a higher confidence in obtaining project objectives at the 1,2-DCA treatment area as compared to performing another DPT ISCO injection event.

Corrective Measure Objectives

The corrective measure objectives for 1,2-DCA in groundwater at SWMU 169 are to protect human health and the environment by treating groundwater that contains 1,2-DCA above the cleanup goals. The concentrations of any associated hazardous constituents also must not exceed the cleanup goals. The cleanup goal for 1,2-DCA in groundwater is the Colorado Groundwater Standard (CGWS) of 5 micrograms per liter (µg/L).

ISEB Technology Description

Bioremediation technologies rely on engineered systems to enhance or stimulate the natural degradation of contaminants in the subsurface. Several species of microbes (primarily bacteria) have been identified that are capable of transforming potentially harmful chlorinated VOCs (CVOCs) into nontoxic chemicals through a process referred to as intrinsic biodegradation. Bioremediation technologies attempt to cultivate subsurface conditions for microbial population growth and thereby enhance degradation processes.

Enhanced reduction dechlorination of CVOCs is an anaerobic process where microbes remove chlorine atoms from CVOCs during respiration. ISEB can effectively reduce the time required for complete degradation of the chlorinated ethenes by injecting a carbon source and a dechlorinating microbial consortium that includes *Dehalococcoides ethenogenes* (DHE). DHE has been shown to completely degrade 1,2-DCA to ethane via reductive dechlorination (Grostern and Edwards, 2006). During reductive dechlorination, the chlorinated ethane (1,2-DCA) serves as an electron acceptor, and chlorine atoms are sequentially replaced with protons to yield chloroethane, ethane, and ethene as daughter products.

To degrade concentrations of 1,2-DCA in groundwater at SWMU 169 in the vicinity of wells 1206MW10 and 1206MW11 **(Figure 5)**, ISEB substrates will be injected to provide carbon and create favorable conditions for reductive dechlorination. A carbon source solution, consisting of emulsified vegetable oil (EVO) and sodium lactate, will provide the indigenous and bioaugmented microorganisms a food source. As these carbon sources are metabolized, hydrogen is released, which provides available protons for reductive dechlorination. The microorganisms in the subsurface will first use available oxygen and other electron acceptors such as ferrous iron (Fe^{2+}) and sulfate to create reducing conditions favorable for reductive dechlorination of 1,2-DCA and its daughter products.

To reduce 1,2-DCA concentrations in the treatment area, a mixture of several substrates was selected including EVO, lactate, and a dechlorinating microbial consortium. Lactate was selected to supply an easily fermentable carbon source to aid in quickly creating reduced conditions required for reductive dechlorination. EVO was chosen to supply a longer-lasting carbon source to support long-term reduction of chlorinated ethane mass by the indigenous and bioaugmentation cultures. Shaw's Dechlorinating Consortium (SDC-9™), a microbial consortium

- Baseline groundwater sampling activities conducted in January 2010
- ISCO injections conducted in February 2010
- Quarterly postinjection groundwater sampling events including:
  - First quarter 2010 in March 2010
  - Second quarter 2010 in June 2010
  - Third quarter 2010 in September 2010
  - Fourth quarter 2010 in December 2010
  - First quarter 2011 in March 2011
  - Second quarter 2011 in June 2011
  - Third quarter 2011 in September 2011

The ISCO injection event was conducted at SWMU 169 in February 2010. Approximately one-third of the proposed oxidant volume was injected into the treatment zone at the site. Out of a total of 22 injection locations, 5 locations successfully received the target oxidant volume (approximately 1,250 gallons), 13 locations received significantly less than the target volume due to surfacing (the escape of oxidant and groundwater to the surface, compromising further injection), and the remaining 4 locations did not receive any oxidant due to an inability to establish injection flow. The targeted injection interval was from 9 to 14 feet below ground surface (bgs), however, subsurface refusal impacted the placement of the injection interval at each location. The injection locations (1206DPT01 through 1206DPT22) are presented in **Figure 2**.

As of the conclusion of the third quarter 2011 sampling event, concentrations of 1,2-DCA in groundwater continue to exceed the cleanup goals (**Table 1** and **Figure 3**). Concentrations of 1,2-DCA in groundwater above the cleanup goals are reported at two well locations (1206MW10 and 1206MW11). Concentrations of 1,2-DCA have not exceeded the cleanup goal (5 micrograms per liter [µg/L]) at the other compliance wells since implementation of the remedy.

Concentrations of 1,2-DCA in groundwater on average have been reduced by 37 percent in the compliance wells (1206MW10 and 1206MW11) from baseline; however, 1,2-DCA concentrations remain above cleanup standards. 1,2-DCA time series plots are included as **Appendix A**.

A potentiometric surface map for the third quarter of 2011 is included as **Figure 4**. A summary of water level information for SWMU 169 wells including top of casing elevations are provided in **Table 2**.

Justification for a Remedy Modification

The presumptive remedy consisting of ISCO using sodium persulfate activated by sodium hydroxide to treat COCs in both soil and groundwater at SWMU 169 has not fully achieved project objectives. As mentioned above, a second injection event is planned for the treatment of PAHs in soil and groundwater and benzene and vinyl chloride in groundwater in the treatment area surrounding the former UST locations, and a change to the presumptive remedy delivery system for the second injection event has been discussed with the CDPHE in a

shown to reductively dechlorinate 1,2-DCA and its degradation daughter products, was chosen to aid in complete dechlorination. The injection of these amendments into the contaminated groundwater will provide the needed elements to reduce the chlorinated ethane mass in the 1,2-DCA treatment area.

Evaluation of Technology Performance

This evaluation takes into account the approach to monitor the performance and effectiveness of the technology. The proposed remedy modification, ISEB, has been evaluated in accordance with the requirements specified in the Part B Permit in addition to other identified criteria that include the following:

Protection of Human Health and the Environment

Enhanced bioremediation uses conventional equipment to distribute bioaugmentation substrates and amendments, such as EVO, sodium lactate, and a microbial consortium into the subsurface. The substrates and amendments are not considered hazardous and do not pose a threat to human health and the environment. However, engineering controls will be utilized to control the potential release of any material into the environment other than for its specified use.

Attainment of Cleanup Levels

Augmented bioremediation to treat 1,2-DCA in groundwater will attain the screening criteria that is protective of human health and the environment for this Resource Conservation and Recovery Act–regulated COC established in the *Final Risk-Based Evaluation Procedures Manual, Module VI, Methodology for Identifying No Further Action at Solid Waste Management Units, Fort Carson, Colorado, Revision 5* (Earth Tech, 2010). Meeting the screening criteria for 1,2-DCA will support the recommendation for no further action at the SWMU. The cleanup goal for 1,2-DCA is the CGWS and is 5 µg/L in groundwater.

Control of Source Releases

ISEB can reduce concentrations of 1,2-DCA in groundwater below the cleanup goal of 5 µg/L.

Compliance with Applicable Standards for Management of Wastes

Wastes generated during the ISEB activities can include treatment liquid waste containing EVO, sodium lactate, SDC-9™, disposable sampling equipment, and personal protective equipment. All wastes will be analyzed and disposed in compliance with waste management standards as specified in the Part B Permit and the Field and Laboratory Procedures Manual (FLPM) (Summit Technical Resources, 2011).

Long-Term Reliability and Effectiveness

Groundwater exposure risks at SWMU 169 will be removed by ISEB. Remediation activities can be completed in approximately 1 to 2 years. Long-term groundwater monitoring will be conducted for a minimum of 3 years following the achievement of all groundwater screening criteria to determine the effectiveness of the remedy.

Reduction of the Toxicity, Mobility, or Volume of Wastes

ISEB will reduce the toxicity, mobility, and volume of contamination through the mass removal of contaminants by focusing on previously identified areas of high concentrations in groundwater. ISEB provides permanent and irreversible reduction in concentrations of 1,2-DCA and produces minimal waste.

Short-Term Effectiveness

The use of ISEB will effectively remove the 1,2-DCA from the zone of contamination, thereby limiting potential short-term risks to the public that may include inhalation of constituents that may be released during treatment operations. Other potential short-term risks to workers may include direct contact and exposure during construction, waste handling, and transportation and physical injury during construction activities. Release to the environment can be controllable during construction. The short-term effectiveness is largely a function of the injection rates, size of injection, the efficiency of the application, and safety precautions.

Implementability

All components of the remedy modification are readily implementable. A previous injection event conducted at SWMU 169 (sodium persulfate and sodium hydroxide injections in the first quarter of 2010) indicates that the porosity and permeability of the subsurface soils limit the volume of remedial solutions that can be successfully applied to the saturated zone. However, the use of 4-inch injection wells for delivery of ISEB amendments and substrates necessary for successful reduction of 1,2-DCA will allow for increased volume into the treatment interval. The area of impact is minimal, is accessible for implementing multiple injection wells, and is relatively shallow to facilitate the remedy implementation. Please note that based on the previous injection event, the recommended spacing between injection wells will be reduced from the previous injection event spacing, resulting in a more uniform distribution of remedial solutions into the treatment formation.

Cost

The present worth of the ISEB remedy modifications for SWMU 169 is approximately $166,781. The total costs consist primarily of the direct capital costs that include work plan preparation, mobilization of construction activities, installation of injection wells, ISEB injections, quarterly groundwater monitoring for a minimum of 3 years, annual reporting, and then demobilization of the activities. The basis of estimate for the ISEB remedy at SWMU 169 is provided in **Appendix B**.

Community Acceptance

Following regulatory approval of the proposed remedy modification, it will then be evaluated based on public reception of the technologies. The remedy modification will be published for public notice with a 45-day comment period prior to final selection of the remedy modification to the Part B Permit by the CDPHE.

Remedy Modification Implementation

The following presents the methodology for the construction, operation, and implementation of the ISEB remedy modification:

Underground Injection Control

Injection systems for groundwater treatment typically fall under the underground injection control (UIC) definition of Class V, which is a nonspecific category for injection of nonhazardous fluids not covered under Classes I through IV. Injection of materials to any shallow groundwater in the state of Colorado under a Class V is regulated by the United States Environmental Protection Agency (EPA) Region 8. Class V injection wells can be rule authorized which precludes the need for a permit. Requirements for a rule-authorized UIC include:

- Owner/operator submits inventory information to register the injection system
- Analysis of existing groundwater contamination
- No potential to cause further groundwater contamination
- Owner/operator submits additional information as needed to determine the potential for groundwater contamination

A UIC rule authorization or permit will be required for the ISEB injections. The inventory information must be submitted prior to construction and operation of a new injection system. When the injection system is no longer in use, the system must be decommissioned or converted. The Directorate of Public Works Environmental Division and the CDPHE will be provided with a copy of the UIC permit or rule authorization prior to commencing work. A list of the inventory information required to determine whether a permit is required rather than a rule authorization is presented in the EPA Site Information Request Fact Sheet, Class V UIC in **Appendix C**.

Injection Well Installation

A total of 11 injection wells is proposed to be installed within the 1,2-DCA treatment area for delivery of the bioremediation amendments and substrates. Injection well locations are presented in **Figure 5**. All well installations will be performed by a Colorado-licensed subcontracted driller under the field supervision of a Shaw geologist. The drilling procedure will follow the procedures specified in the FLPM. Each well will be constructed of a 4-inch inside diameter, continuous-wrapped 0.010-inch slot screen with a 4-inch inside diameter riser composed of Schedule 40 polyvinyl chloride (PVC) pipe (**Figure 6**). The screen interval will be from 11 to 16 feet bgs for each injection well, targeting the saturated zone at the 1,2-DCA treatment area (**Figure 5**). The planned vertical target treatment interval (11 to 16 feet bgs) is based on review of boring logs and groundwater elevation data from monitoring wells and soil borings installed in the 1,2-DCA treatment area. A filter pack consisting of 10–20 filter sand will be placed around the screen from the bottom of the borehole to at least 1 foot above the screen. A 2-foot bentonite seal will be placed above the filter pack to prevent downward migration of cement grout, when possible. The seal will consist of tamped bentonite granules, chips, pellets (when unsaturated conditions exist), or a combination of the three. This seal may also be installed by the tremie method if required by field conditions. If the seal is positioned below the water table, the use of pellets only is preferable. The bentonite will be installed in four 6-inch lifts, with each lift hydrated with potable tap water before proceeding. Each lift will be hydrated for 30 minutes, with water added as necessary, before placement of the next lift. After placement of the final lift, the bentonite seal will be allowed to hydrate for an additional 2 hours prior to grouting. The flush-mount surface completions for each well will consist of an appropriately sized, traffic-rated, cast-iron assembly with a protective lid that will be centered over the monitoring well and surrounded by a 6-inch-thick by 20-inch-square cement pad. The top of each observation well will be fitted with a locking watertight J-plug.

Survey Procedures

The newly installed injection wells will be surveyed in accordance with Section 2.14 of the FLPM. A global positioning system surveying unit will be used to determine the coordinates of the well locations. Vertical elevations will be determined for the immediate ground surface and at the top of the PVC casing. Actual accuracy encountered during surveying is dependent on the number of satellites available, and this will be documented.

ISEB Activities

The ISEB treatment will consist of injecting EVO, sodium lactate, and SDC-9™ bioaugmentation culture solution into the shallow aquifer within the 1,2-DCA treatment area at depths between 11 and 16 feet bgs. The treatment area consists of an approximate 3,600-square-foot area encompassing compliance wells 1206MW10 and 1206MW11 with 1,2-DCA concentrations above cleanup criteria (**Figure 5**). The following sections describe the ISEB remedy modification planned for SWMU 169.

Injection System Setup

The treatment program design consists of at least one injection application delivering a dilute carbon substrate containing EVO and sodium lactate combined with the microbial consortium, SDC-9™, into the treatment area.

Shaw will utilize injection wells to introduce the ISEB amendments into the subsurface. A total of 11 injection wells will be installed within the 3,600-square-foot treatment area (**Figure 5**). The number and spacing of the injection locations are based on a 10-foot distribution radius of influence (ROI) determined by site lithology, COC concentrations, hydrogeologic conditions, and results of the ISCO DPT injection event conducted in 2010 at SWMU 169. The 10-foot ROI is a reduction from the 15-foot ROI used during the ISCO injection event. Difficulty achieving the target ISCO injection volumes using 1.5-inch DPT wells due to tight subsurface conditions is the basis for the reduction in the anticipated ROI. Further, the use of 4-inch injection wells will allow for increased contact as compared to the 1.5-inch DPT wells, thereby allowing for increased coverage compared to the DPT wells. Please note that each injection well will vary in the achieved ROI in that there are preferential pathways established in the subsurface which largely determines the amount of coverage achieved. In general, the closer the injection points are placed to each other, the higher the confidence in the ability to influence the target area and reduce COCs to below action levels. The ISEB amendments will be injected in each of the locations through a 5-foot screen in the saturated zone (11 to 16 feet bgs). This method of selective vertical injection will deliver ISEB amendments across the entire vertical extent of the target treatment interval.

An injection system consisting of a six-point manifold, approximately two 55-gallon drums of EVO, one 55-gallon drum of lactate, 5 liters of SDC-9™, a 6,000-gallon tank for mixing, an injection pump, sample ports, pressure indicators, flow meters, PVC piping, and associated valves and fittings will be mobilized to the site and assembled adjacent to the injection well field. The injection system will be powered by either a local power supply (approval pending) or a 50-kilowatt portable generator. Once the injection system is assembled, the injection system components and products will be enclosed in an exclusion zone. The injection wells consist of air bleed valves, flow valves, and pressure and flow monitoring instrumentation for each of the injection wells. Shaw personnel will place the 6,000-gallon mixing/injection tank at the site and connect the wellheads to the injection system via clear, flexible PVC hose via cam-lock couplings. The process and design diagram for the injection system proposed for the 1,2-DCA vertical treatment zone is shown in **Figure 7**.

The carbon substrates EVO and sodium lactate are food-grade substances and are not considered hazardous. For general safety from splashing and mechanical devices, modified Level D personal protective equipment will be worn at all times when working around the operating injection systems, as detailed in the site health and emergency response plan.

Injection Volumes

The injection goal for total ISEB carbon substrate injection volume is approximately 11,000 gallons of potable water, 110 gallons of EVO, 54 gallons of sodium lactate, and 5 liters of SDC-9™ that will be thoroughly mixed and distributed throughout the vertical treatment zone. This equates to approximately 1,000 gallons for each of the 11 injection wells. The volumes selected to be injected are based on review of site-specific data and previous experience at SWMU 169 obtained during the January 2010 ISCO injections. The use of 4-inch-diameter wells should allow for the subsurface to accept larger volumes of remedial solutions. In addition, the volume of biological amendments and substrates needed for treatment is lower than the planned volumes for ISCO. ISEB substrate volumes will vary per location if injection pressures increase above 35 pounds per square inch (psi) in the injection wells and substrate surfaces and/or injection flow rates drop to below 0.5 gallons per minute (gpm). The proposed injection parameters for the ISEB substrates, including the calculated injection volumes, are presented in **Table 3**. The calculations prepared for the required substrate injection volumes based on the known or estimated site parameters are presented in **Appendix D**.

Injection Rates

The rate at which the ISEB substrate and microbial consortium solutions are injected into the subsurface is initially determined by the known soil/aquifer characteristics as identified in the historical documents presented in Section 3.0. Based upon review of site-specific boring logs and groundwater data and based on the flow rates achieved during the ISCO injection event, injection flow rates are expected to be between 1 and 3 gpm. The proposed injection parameters for the ISEB substrates, including the calculated injection rates, are presented in **Table 3**. The calculations prepared for the required substrate injection rates based on the known or estimated site parameters are presented in **Appendix D**.

ISEB Carbon Amendment and Microbial Consortium (SDC-9™) Development

An oil transfer pump will be used to transfer the EVO and sodium lactate to the 6,000-gallon storage tank. Dilution water will be delivered to the 6,000-gallon tank via an approved water source. Electrical power will be provided to the injection system by either a local supply or a portable 50-kilowatt generator. The following steps are to be followed when mixing each batch of the carbon amendment solution:

1. Transfer 52 gallons of EVO to the 6,000-gallon mixing tank the day before injections.
2. Transfer 27 gallons of sodium lactate to the 6,000-gallon mixing tank the day before injections.
3. Transfer 0.5 liters of SDC-9™ to the 6,000-gallon mixing tank the day before injections to assist with the reduction of dissolved oxygen (DO) concentrations in the mixing tank.
4. Transfer 5,163 gallons of potable water to the 6,000-gallon mixing tank. Mixing will be provided by the agitation created by adding the water to the carbon sources.
5. Monitor for DO in the mixing tank to confirm concentrations less than 1.0 milligrams per liter (mg/L) prior to adding the remaining 4.5 liters of SDC-9™.

6. If necessary, argon gas may be diffused into the tank mixture to remove any residual oxygen and reduce DO concentrations to less than 1.0 mg/L prior to adding the remaining volume of SDC-9™.

ISEB Carbon Substrate and Microbial Consortium (SDC-9™) Injections

Following the development of the respective ISEB solutions, the subsurface injection will begin. The solutions will be injected simultaneously into a maximum of six injection wells. During injection, flow rates and injection pressures will be monitored and recorded. Injection rates will be increased incrementally by no more than 0.5 gpm until a steady state equal to or less than 5 gpm is achieved. Initial pressure and flow monitoring will be completed as often as time allows, but at a minimum of once an hour. Once the daily injection rates, injection pressures, and overnight aquifer rebound have been established, the injection system recording will be scaled back to 4–6 times per day. Field forms that will be used by the Shaw field personnel to collect ISEB injection system and water level measurements are provided in **Appendix E**.

The following steps are necessary for the injection ISEB substrates into the groundwater:

1. Record the time, depth to water in the wells, the flow totalizers, the four injection manifold points, and wellhead gauges pressure readings.
2. Begin ISEB injection, starting at approximately 0.5 gpm. Injection pressure at injection wellheads should not exceed 35 psi (above 35 psi may force the enhanced reductive dechlorination (ERD) substrate solution to surface).
3. Monitor and record the depth-to-water elevations in the wells until a steady state is achieved.
4. Continue injection of the solution while monitoring depth-to-water elevations.
5. Increase injection flow in 0.5-gpm increments while monitoring groundwater mounding until the maximum flow achieved during the water injection test is obtained.
6. Repeat appropriate steps for the injection of ERD solution into the next six injection wells.

Increasing the flow rate above the previous maximum will be considered after one complete day of the maximum flow rate. Injection pressures measured at the wellhead during the initial days of ERD solution injection will be maintained below 35 psi for the injection wells.

ISEB Injection Duration

The length of time required for the carbon amendment and SDC-9™ injections was calculated using a six-point manifold and achieving an average 2-gpm injection rate for 8 hours per day. The ISEB injections are estimated to take 2 days for the injection and 1 day each for setup and breakdown for a total of approximately one 5-day week. The proposed injection parameters for the ISEB substrates, including the estimated time for the injection phases, are presented in **Table 3**. The calculations prepared for the required substrate injection volumes based on the known or estimated site parameters are presented in **Appendix D**.

Land-Use Controls

Short-term land-use controls will be required during the implementation of excavation activities to prevent human contact with groundwater conditions at SWMU 169. The expected end land use for SWMU 169 is residential, and the proposed remedy is expected to achieve response complete with no expected long-term land-use controls or land management requirements.

ISEB Compliance and Performance Monitoring

The groundwater monitoring program specified in the PRWP and the Part B Permit consists of the collection of groundwater samples from compliance wells 1206MW01A, 1206MW03, 1206MW07, 1206MW08, 1206MW09, 1206MW10, 1206MW11, 1206MW12, 1206MW13, and LF6MW8 on a quarterly basis. Groundwater samples from the 10 compliance wells are to be sampled for VOCs via EPA Method 8260B and for PAHs via EPA Method 8270D. In addition, the following field parameters are to be monitored during each sampling event:

- Depth to water
- Dissolved oxygen
- Oxygen reduction
- Specific conductivity
- pH
- Temperature
- Ferrous iron

In addition to the analytical methods specified in the PRWP and the Part B Permit, groundwater samples collected from compliance wells 1206MW10 and 1206MW11 are planned in order to evaluate the ISEB remedy. Groundwater samples from wells 1206MW10 and 1206MW11 are planned to be analyzed for the following laboratory analyses prior to implementation of the ISEB remedy and on a post implementation quarterly basis:

- Alkalinity using EPA Method 310.2
- Nitrate/nitrite/sulfate/chloride using EPA Method 300.0
- Total organic carbon using EPA Method 415.1
- Dissolved gases (methane, ethane, ethene) by EPA Method RSK 175
- DHE quantification analysis using Shaw's method SOP-TAG-BIO-027

The above-mentioned performance analytical methods planned for wells 1206MW10 and 1206MW11 will be reviewed annually, and recommendations will be made whether to continue with the performance quarterly monitoring or decrease the number of parameters at these wells in each Presumptive Remedy Annual Progress Report.

Compliance wells 1206MW07 and 1206MW08 will be destroyed during implementation of the second round of ISCO activities in the area of the former UST pits. Replacements for these compliance wells will be installed in

accordance with the FLPM and discussed in the Presumptive Remedy Annual Progress Report due in December of 2012.

Schedule

Coordination and setup for the ISEB remedy modification will include the approval process for the CDPHE, registration with the UIC program, and coordination with subcontractors. This is expected to require approximately 4 months. Following CDPHE approval, the material orders will be placed to ensure that sufficient quantities can be produced and delivered to the site. Injection well installation will proceed when the necessary permits have been obtained.

Baseline monitoring samples will be collected from compliance wells 1206MW10 and 1206MW11 before injecting the bioaugmentation substrates and amendments and the oxygen release compound slurry. Baseline sampling is expected to take 72 hours.

ISEB field implementation is estimated to require approximately 1 month. Field implementation will be scheduled as soon as possible after receiving approval from the CDPHE and the Region 8 UIC Program.

The monitoring period will continue quarterly and will continue for a minimum of 3 years following reduction of all COCs to below cleanup standards.

Once groundwater concentrations are reduced below the applicable cleanup goals for 12 consecutive quarters (3 years) and confirmation soil samples collected from within the former UST tanks are below screening criteria, Shaw will prepare a remedy completion report. This report will be submitted within 90 days of the final groundwater monitoring event and will detail the activities performed, analytical data collected, and contaminant concentration trends.

If you have any questions or require additional information, please contact me at (720) 554-8202.

Sincerely,

Gary D. Parks. P.G.
Project Manager
Shaw Environmental, Inc.

References

Colorado Department of Public Health and Environment (CDPHE), 2006. *Resource Conservation and Recovery Act Hazardous Waste Part B Permit No. CO-06-09-29-01*, Approved September 29, 2006, Implemented October 29, 2006.

Earth Tech, Inc. (Earth Tech), 2008. *Final RCRA Facility Report Former Building 1211 (FTC-088/SWMU 169), Fort Carson, Colorado.*

Earth Tech, 2010. Final *Risk-Based Evaluation Procedures Manual, Module VI, Methodology for Identifying No Further Action at Solid Waste Management Units, Fort Carson, Colorado (Revision 5)*, December.

Grostern, A., and E. Edwards, 2006. American Society for Microbiology, Applied and Environmental Microbiology, *Growth of Dehalobacter and Dehalococcoides spp. During Degradation of Chlorinated Ethanes*, Volume 72, No. 1 428-436, January.

Shaw Environmental, Inc. (Shaw), 2009. *Final Presumptive Remedy Work Plan, Former Building 1211 Underground Storage Tank Site (FTC-088/SWMU 169), Fort Carson, Colorado*, December.

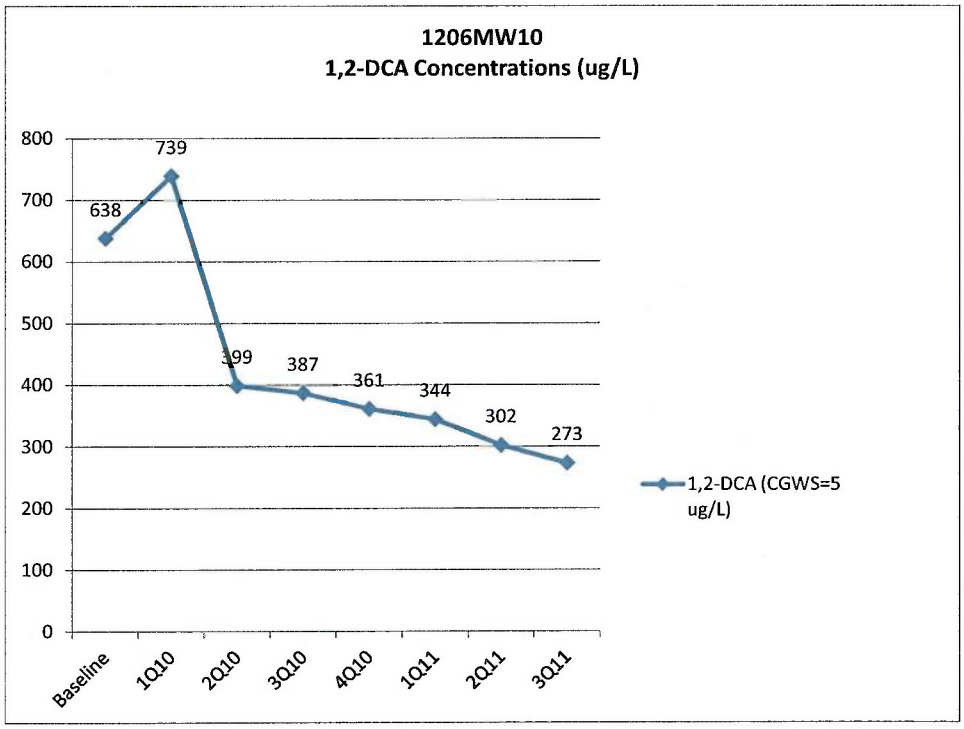
Shaw, 2010. *Draft Final Presumptive Remedy Annual Progress Report for 2010, Former Building 1211 (FTC-088/SWMU 169), Fort Carson, Colorado*, December.

Shaw, 2011. *Draft Final Presumptive Remedy Annual Progress Report for 2011, Former Building 1211 (FTC-088/SWMU 169), Fort Carson, Colorado*, December.

Summit Technical Resources, 2011. *Final Field Laboratory Procedures Manual, Fort Carson Army Installation, Fort Carson, Colorado*, October.

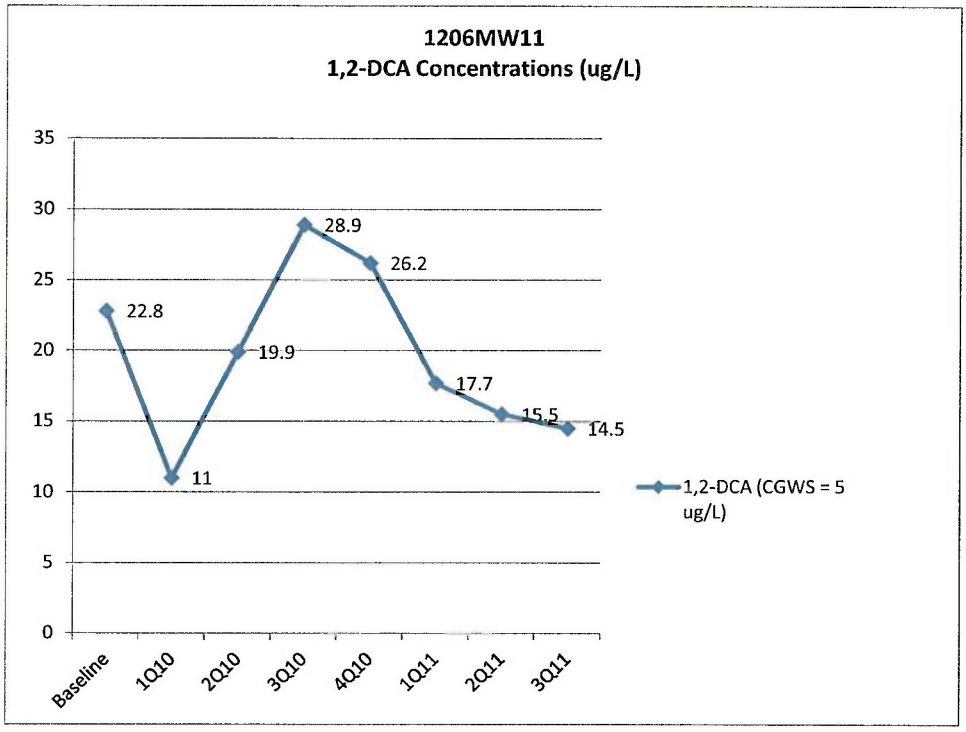
APPENDIX A
1,2-DCA Time Series Plots
SWMU 169
Fort Carson, Colorado

Sample Event	1,2-DCA (CGWS=5 ug/L)	1,2-DCP (CGWS=5 ug/L)
Baseline	638	7.79
1Q10	739	8.48
2Q10	399	3.93
3Q10	387	4.95
4Q10	361	4
1Q11	344	3.85
2Q11	302	3.53
3Q11	273	2.33



APPENDIX A
1,2-DCA Time Series Plots
SWMU 169
Fort Carson, Colorado

Sample Event	1,2-DCA (CGWS = 5 ug/L)
Baseline	22.8
1Q10	11
2Q10	19.9
3Q10	28.9
4Q10	26.2
1Q11	17.7
2Q11	15.5
3Q11	14.5



APPENDIX B
Basis of Estimate for ISEB Remediation
SWMU 169
Fort Carson, Colorado

Summary Description	Costs
Capital Costs	
Groundwater Remediation Cost	
Injection Well Installation	$13,260
ISEB Injections	$13,021
Subtotal Direct Costs	**$26,281**
Regulatory Documents	
Remedy Modification Request	$7,500
Response Complete Report	$31,000
Subtotal Indirect Costs	**$38,500**
Subtotal Capital Costs	**$64,781**
Operations & Maintenance	
Groundwater Treatment O&M Costs	
Long-Term Monitoring/Confirmatory Sampling (3 Years)	$102,000
Subtotal Capital Costs	**$102,000**
Total Cost	
Present Value for Capital	$64,781
Present Value for O&M	$102,000
Present Value Total	**$166,781**

EPA Site Information Request Fact Sheet
Class V Underground Injection Control

Aquifer Remediation Injection Wells
Injection of Oxygenating Compounds

The Underground Injection Control (UIC) Program, created under the authority of the Safe Drinking Water Act (SDWA), is a preventative program aimed at protecting existing and future underground sources of drinking water (USDWs). Shallow wells or disposal systems that discharge fluids into the subsurface are known as Class V wells and can be authorized to inject by rule or permit. Class V wells that have the potential for ground water contamination or degradation are usually permitted. Those that do not have a potential to contribute to contamination or degradation of ground water are usually rule authorized, once inventory information has been submitted according to the requirements of 40 CFR 144.26.

The following information is needed to evaluate the impact a shallow injection well/disposal system used for aquifer remediation will have on the local hydrogeologic system, potential for USDW contamination, and whether a **permit** for this operation, rather than a **rule authorization**, should be required.

Please provide the following information:

- ☐ Property owner of facility including address, phone and fax numbers.
- ☐ Operator of facility including mailing address, phone and fax numbers.
- ☐ Responsible party for the operation, maintenance, and closure of the injection system including address, phone and fax numbers.
- ☐ Name of the facility and physical location.

- ☐ Map of the site including extent of contaminant plume, injection well locations or general area where injection will occur, and proposed or existing monitoring wells.
- ☐ Is this a proposed or existing system?
- ☐ Name, address and phone number for contact at the State Agency authorizing site clean up.
- ☐ Brief description of the type of contamination and when it occurred.
- ☐ Type of proposed injection well. (example: water well, trench, injection gallery, Geoprobe, etc.)
- ☐ Description of the proposed injectate.
- ☐ Hydrogeologic description, location, depth, and current use (if any) of the receiving formations.
- ☐ Estimation of time frame for when injection activities will begin and end.

APPENDIX D
EVO Demand
SWMU 169
Fort Carson, Colorado

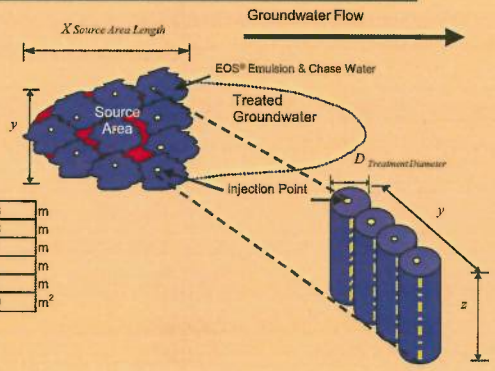
EOS Remediation, LLC

EOS® SOURCE AREA & DNAPL DESIGN WORKSHEET

U.S. Version 2.1f, Rev. Date: June 18, 2008
www.EOSRemediation.com

Help

Site Name:	Ft. Carson
Location:	SWMU 169
Project No.:	132626



Step 1: Select a Substrate from the EOS® Family of Bioremediation Products

Substrate Selected (pick from drop down list): EOS® 598B42 (Preferred for Chlorinateds)
For Product Literature Click Here

Step 2: EOS® Consumption During Contaminant Biodegradation / Biotransformation

Section A: Source Area Dimensions

Length of treatment area parallel to groundwater flow, "x"	60	ft	18.3	m
Width of treatment area perpendicular to groundwater flow, "y"	60	ft	18.3	m
Minimum depth to contamination	9	ft	2.7	m
Maximum depth of contamination	14	ft	4.3	m
Treatment thickness, "z"	5	ft	1.5	m
Treatment zone cross-sectional area, A = y * z	300	ft^2	27.9	m^2

Section B: Groundwater Flow Rate / Site Data

Soil Characteristics

Nominal Soil Type (pick from drop down list)	Silt			
Total Porosity (accept default or enter n)	0.20	(decimal)		
Effective Porosity (accept default or enter n_e)	0.20	(decimal)		
Soil bulk density; (1-n)*2.65 g/cc (accept calculated or enter dry bulk density)	2.12	g/cc	132	lbs / ft^3
Fraction of organic carbon: foc	0.0050	range: 0.0001 to 0.01		

Hydraulic Characteristics

Hydraulic Conductivity (accept default or enter K)	2.65	ft/day	9.3E-04	cm/sec
Hydraulic Gradient (accept default or enter i)	0.0098	ft/ft		

Note: Since the hydraulic gradient ($i = dh/dx$) is negative, we ask you to enter $-i$ in the EOS® Design Tool so that you can enter a positive number for convenience.

Non-reactive Transport Velocity, $V_x = -(K \times i) / n_e$	0.13	ft/day	0.040	m/day
Groundwater flow rate through treatment zone, $Q = -KiA$	58.28	gallons/day	220.62	L/day

Section C: Calculated Contact Length

Contact time (τ) between oil and contaminants (accept default or enter τ)	180	typical values 60 to 180 days, see comment		
Calculated Contact Length (X) = $\tau * V_x$	23.4	ft	7.1	m

Treatment zone volume	18,000	ft^3	510	m^3
Treatment zone groundwater volume (volume * porosity)	26,928	gallons	101,941	L

APPENDIX D
Intermediate Zone Lactate Demand Calculations
Corrective Measure Implementation Work Plan
SWMU 169
Fort Carson, Colorado

Enhanced Anaerobic Reducitve Dechlorination Electron Acceptor and Donor Calculations

Site: Ft. Carson SWMU 169
Date: 02/06/12
Version: 1.0

The following set of calculations estimate the carbon source demand reuqired to achieve complete reductive dechlorination of chlorinated ethenes in groundwater
Enter the site-specific values in the cells shaded green

1.0 Extent of Plume Requiring Remediation

Plume Area	3600	ft^2		
Thickness of contaminated saturated zone	5	ft		
Volume of contaminated saturated zone	18000	ft^3		
Porosity	0.2			
Treatment Zone Pore Volume	3,600	ft^3		
Treatment Zone Pore Volume	26,928	gallons	=	101,922 Liters

2.0 Dissolved Phase Electron Donor Demand

Chemical of Concern	Demand (meq/mMole)	MW (mg/mMole)	Conc. (mg/L)	Eq Demand (meq/L)	Demand (meq)
Dichloroethane (1,2-DCA)	4	98.96	0.387	0.016	1.59E+03
Trichloroethene (TCE)	6	131.4		0.000	0.00E+00
Dichloroethene (DCE) - sum of all DCE isomers	4	96.9		0.000	0.00E+00
Vinyl Chloride (VC)	2	62.5		0.000	0.00E+00
			Total Dissolved Phase Demand (meq)		**1.59E+03**

3.0 Sorbed Phase Electron Donor Demand

Soil bulk density	2.31	g/cm^3	=	144 lb/ft^3
Fraction of organic carbon (f_{oc})	0.005			

Chemical of Concern	Koc (L/kg)	GW Conc. (mg/L)	Soil Conc. (mg/kg)	Cont. Mass (mg)	Demand (meq)
Dichloroethane (1,2-DCA)	1.279	0.387	0.00	2.92E+03	1.18E+02
Trichloroethene (TCE)	107	0.000	0.00	0.00E+00	0.00E+00
Dichloroethene (DCE)	80	0.000	0.00	0.00E+00	0.00E+00
Vinyl Chloride (VC)	2.5	0.000	0.00	0.00E+00	0.00E+00
			Total Sorbed Phase Demand (meq)		**1.18E+02**

APPENDIX D
Intermediate Zone Lactate Demand Calculations
Corrective Measure Implementation Work Plan
SWMU 169
Fort Carson, Colorado

4.0 Competing Electron Acceptors Demand

Electron Acceptor	Demand (meq/mMole)	MW (mg/mMole)	Conc. (mg/L)	Eq Demand (meq/L)	Demand (meq)
Dissolved Oxygen	4	32	3.02	0.38	3.85E+04
Sulfate	8	96	10.00	0.83	8.49E+04
Nitrate	5	62	5.00	0.40	4.11E+04
Estimated Fe(III) reduction demand	1	56	10.00	0.18	1.82E+04
			Total Competing Electron Acceptor Demand (meq)		**1.83E+05**

5.0 Electron Donor Calculations

Calculated Electron Donor Demand	1.84E+05	(dissolved + sorbed + competing acceptors)
Safety Factor	3	Recommend 1-4x
Total Demand	**5.53E+05**	**milli-equivalents**

Electron Donor	Moles H_2/Mole	meq/mMole	MW	Mass (kg)	Mass (lb)
Sodium Lactate ($NaC_3H_6O_3$)	2	4	112	1.55E+01	3.41E+01

6.0 Target In-Situ Concentrations

Treatment Zone Pore Volume: 101,922 L

Electron Donor	Mass (kg)	Target In-Situ Conc. (mg/L)	Target In-Situ Conc. (%)
Na-Lactate ($NaC_3H_6O_3$)	15.49	**152**	**0.02**

7.0 Lacate Dosing

If the target in-situ concentration is less than 1000 mg/L, use 1000 mg/L concentration as a default minimum level.

Target In-Situ Concentration (mg/L)	1,000	mg/L		
Treatment Zone Pore Volume	101,922	Liters		
Total Lactate Demand	102	kg		
Concentration of Na-Lactate (delivered)	60	% (w/w)		
Weight per drum	605	lbs (net weight)		
Density of Na-Lactate Solution	11.176	lb/gal		
Volume per drum	54.1	gallons	=	205 liters
Mass of Na-lactate per drum	165	kg		
Total Drums of Na-Lactate Required	1	drums		
Mass of 60% lactate solution	610	lbs (net weight)		
Volume of 60% lactate solution	54	gallons	=	205 liters

APPENDIX D
EVO Demand
SWMU 169
Fort Carson, Colorado

Section D: Design Lifespan For One Application 5 year(s) typical values 5 to 10 years

Estimated total groundwater volume treated over design life 133,283 gallons 504,566 L

Section E: Electron Acceptors

Dissolved Phase Electron Donor Demand

Inputs	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e⁻ equiv./ mole	Stoichiometry *Contaminant/H₂ (wt/wt H_2)*	Hydrogen Demand *(g H_2)*
Dissolved Oxygen (DO)	0 to 8	3	32.0	4	7.94	190.7141237
Nitrate Nitrogen (NO_3^- - N)	1 to 10	5	62.0	5	12.30	205.0450549
Sulfate (SO_4^{2-})	10 to 500	10	96.1	8	11.91	423.5391474
Tetrachloroethene (PCE), C_2Cl_4			165.8	8	20.57	
Trichloroethene (TCE), C_2HCl_3			131.4	6	21.73	
cis-1,2-dichloroethene (c-DCE), $C_2H_2Cl_2$			96.9	4	24.05	
Vinyl Chloride (VC), C_2H_3Cl			62.5	2	31.00	
Carbon tetrachloride, CCl_4			153.8	8	19.08	
Chloroform, $CHCl_3$			119.4	6	19.74	
sym-tetrachloroethane, $C_2H_2Cl_4$			167.8	8	20.82	
1,1,1-Trichloroethane (TCA), CH_3CCl_3			133.4	6	22.06	
1,1-Dichloroethane (DCA), CH_2CHCl_2		0.387	99.0	4	24.55	7.955149171
Chloroethane, C_2H_5Cl			64.9	2	32.18	
Perchlorate, ClO_4^-			99.4	8	12.33	
Hexavalent Chromium, Cr[VI]			52.0	3	17.20	
User added						
User added						
User added						

Sorbed Phase Electron Donor Demand

The concentration of the sorbed contaminant can be estimated by: $C_{SOIL} = K_{OC} \times f_{oc} \times C_{WATER}$

Where: K_{oc} is partition coefficient with respect to organic carbon.

f_{oc} (fraction organic carbon) is the mass of organic matter in soil divided by the total mass of soil

C_{WATER} is the concentration of the contaminant in the groundwater

Default values for Koc taken from: US EPA, Superfund Section, APPENDIX K, Soil Organic Carbon (Koc) / Water (Kow) Partition Coefficients (Average Value Used)

Inputs Adjust K_{OC} as necessary to provide site specific estimates or enter sediment concentration (C_{SOIL})	K_{oc} (L/kg)	C_{SOIL} (mg/Kg)	Mass (g)	Hydrogen Demand *(g H_2)*
Tetrachloroethene (PCE), C_2Cl_4	272			
Trichloroethene (TCE), C_2HCl_3	97			
cis-1,2-dichloroethene (c-DCE), $C_2H_2Cl_2$	38			
Vinyl Chloride (VC), C_2H_3Cl	241			
Carbon tetrachloride, CCl_4	158			
Chloroform, $CHCl_3$	53			
sym-tetrachloroethane, $C_2H_2Cl_4$	79			
1,1,1-Trichloroethane (TCA), CH_3CCl_3	139			
1,1-Dichloroethane (DCA), CH_2CHCl_2	54	0.10	112.91	4.60
User added				
User added				
User added				

APPENDIX D
EVO Demand
SWMU 169
Fort Carson, Colorado

Section F: Additional Hydrogen Demand and Carbon Losses

Generation (Potential Amount Formed)	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e equiv./ mole	Stoichiometry *Contaminant / H_2*	Hydrogen Demand *(g H_2)*	DOC Released *(moles)*
Estimated Amount of $Fe2^+$ Formed	10 to 100	50	55.8	1	55.41	455.3244919	
Estimated Amount of Manganese (Mn^{2+}) Formed		5	54.9	2	27.25	92.56833613	
Estimated Amount of CH_4 Formed	5 to 20	10	16.0	8	1.99	2536.007505	
Target Amount of DOC to Release	60 to 100	80	12.0				3360.69

Design Safety Factor: 2.0 typical values 1 to 3

Calculations assume:

1.) all reactions go to completion during passage through emulsified edible oil treated zone; and,
2.) perfect reaction stoichiometry.

EOS® Requirement Calculations Based on Hydrogen Demand and Carbon Losses

Stoichiometric Hydrogen Demand: 17.3 pounds
DOC Released: 383.7 pounds

EOS® Requirement Based on Hydrogen Demand and Carbon Loss

462 lbs

Step 3: EOS® Requirement Based on Attachment by Aquifer Material

Soil Characteristics

Effective treatment thickness, "z_e" (typically less than 40%)

For Additional Information on Effective Thickness, Click Here

Weight of sediment to be treated: lbs

Adsorptive Capacity of Soil (accept default or enter site specific value): 0.0040 lbs EOS® / lbs sediment

EOS® Attachment by Aquifer Material[1]

- Fine sand with some clay 0.001 to 0.002 lbs EOS® / lbs soil
- Sand with higher silt/clay content 0.002 to 0.004 lbs EOS® / lbs soil

[1]Default values provided based on laboratory studies completed by NCSU

For Additional Data, Click Here

EOS® Requirement Based on Oil Entrapment by Aquifer Material

lbs

Summary – How much EOS® do you need?

Suggested Quantity of EOS® for Your Project: 2 drums

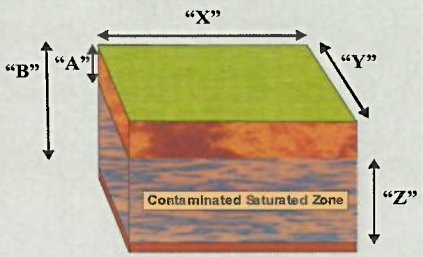
APPENDIX D
SDC-9 Demand
SWMU 169
Fort Carson, Colorado

SDC-9 Dosage Estimating Software

Site Name:	SWMU 169
Location:	Ft. Carson, CO
Project No.:	132626

Treatment Area Dimensions

Length of treatment area parallel to groundwater flow, "X"	60	ft	18.3	m
Width of treatment area perpendicular to groundwater flow, "Y"	60	ft	18.3	m
Minimum depth to contamination, "A"	9	ft	2.7	m
Maximum depth of contamination, "B"	14	ft	4.3	m
Treatment thickness, "Z"	5	ft	1.5	m



Site Data

Soil Characteristics

Nominal Soil Type (enter clay, silt, silty sand, or sand): silty clay

Hydraulic Characteristics

Effective Porosity (accept default or enter n_e): 0.20 (decimal)

Treatment zone volume	18,000			
Treatment zone water volume	3,600	ft^3	101,941	L

Dechlorinating Consortium Concentration

Dehalococcoides like organisms/L as determined by qPCR: > 1.0E+11

Design Final Concentration (DHC/L) (accept default or enter concentration): 5.00E+06 typical values 5×10^6 to 1×10^7

Suggested Quantity of Dechlorinating Consortium: 5 Liters

APPENDIX E
ISEB Injection System
System Measurements Field Form
SWMU 169
Fort Carson, Colorado

Pre-Batch Water Transfer Flowmeter Reading :_________________ | ___________gallons | Page ____ of _____ Pages Date____________

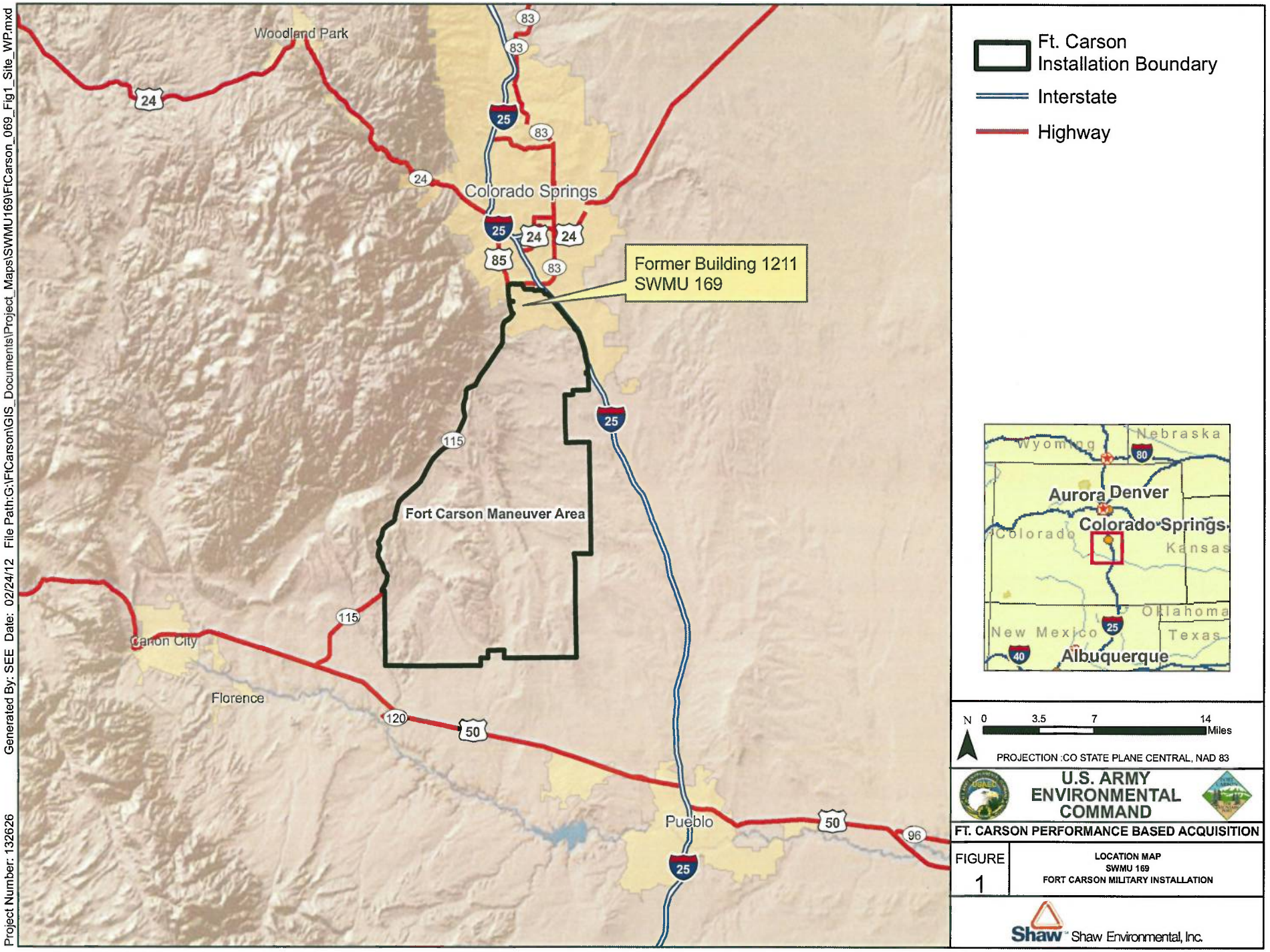
Injection parameter		INJECTION POINT				System measurements	
		INJ. Point	INJ. Point	INJ. Point	INJ. Point		
TIME:_________		INITIAL	INITIAL	INITIAL	INITIAL		INITIAL
Manifold (psi)						Pre-filter (psi)	
Injection well (psi)						Post-filter (psi)	
Flow rate (gpm)						Injection pump (psi)	
Flow total (gal)						Injection flow (gpm)	
						Injection vol. (gal)*	
TIME:							
Manifold (psi)						Pre-filter (psi)	
Injection well (psi)						Post-filter (psi)	
Flow rate (gpm)						Injection pump (psi)	
Flow total (gal)						Injection flow (gpm)*	
						Injection vol. (gal)*	
TIME:							
Manifold (psi)						Pre-filter (psi)	
Injection well (psi)						Post-filter (psi)	
Flow rate (gpm)						Injection pump (psi)	
Flow total (gal)						Injection flow (gpm)*	
						Injection vol. (gal)*	
TIME:							
Manifold (psi)						Pre-filter (psi)	
Injection well (psi)						Post-filter (psi)	
Flow rate (gpm)						Injection pump (psi)	
Flow total (gal)						Injection flow (gpm)*	
						Injection vol. (gal)*	

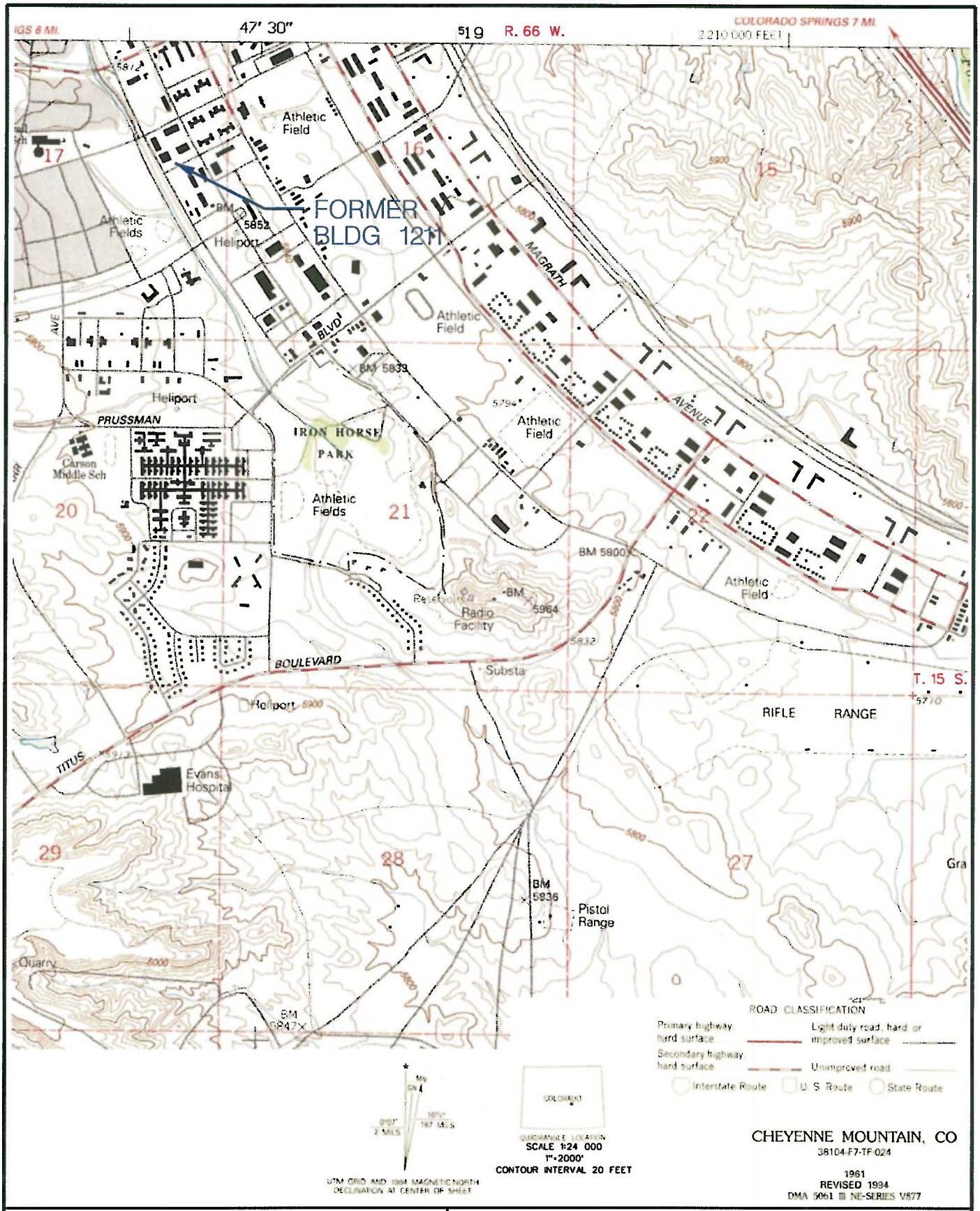
** denotes calculated values.*
gal denotes gallons.
gpm denotes gallons per minute.
ISEB denotes in situ enhanced bioremediation.
psi denotes pounds per square inch.
Initial pressures measured during initial injection to be maintained below 15 psi for injection well screens.

APPENDIX E
ISEB Injection System
Water Level Measurements Field Form
SWMU 169
Fort Carson, Colorado

Sample Schedule (Hour: Min)	Time	Depth to water (feet BTOC)	Dissolved oxygen (mg/L)	Redox (mV)	Specific Conductivity (mS/cm)	pH	Temperature (C)	Water color
Initial								

BTOC denotes below top of casing.
C denotes Celsius.
ISEB denotes in situ enhanced bioremediation.
mg/L denotes milligrams per liter.
mS/cm denotes millisiemens per centimeter.
mV denotes millivolt.


Woodland Park
Colorado Springs
Former Building 1211
SWMU 169
Fort Carson Maneuver Area
Canon City
Florence
Pueblo
Ft. Carson
Installation Boundary
Interstate
Highway
Wyoming
Nebraska
Aurora
Denver
Colorado Springs
Colorado
Kansas
Oklahoma
New Mexico
Texas
Albuquerque
N
0
3.5
7
14
Miles
PROJECTION :CO STATE PLANE CENTRAL, NAD 83
U.S. ARMY
ENVIRONMENTAL
COMMAND
FT. CARSON PERFORMANCE BASED ACQUISITION
FIGURE
1
LOCATION MAP
SWMU 169
FORT CARSON MILITARY INSTALLATION
Shaw Environmental, Inc.
Generated By: SEE Date: 02/24/12 File Path:G:\FtCarson\GIS_Documents\Project_Maps\SWMU169\FtCarson_069_Fig1_Site_WP.mxd
Project Number: 132626



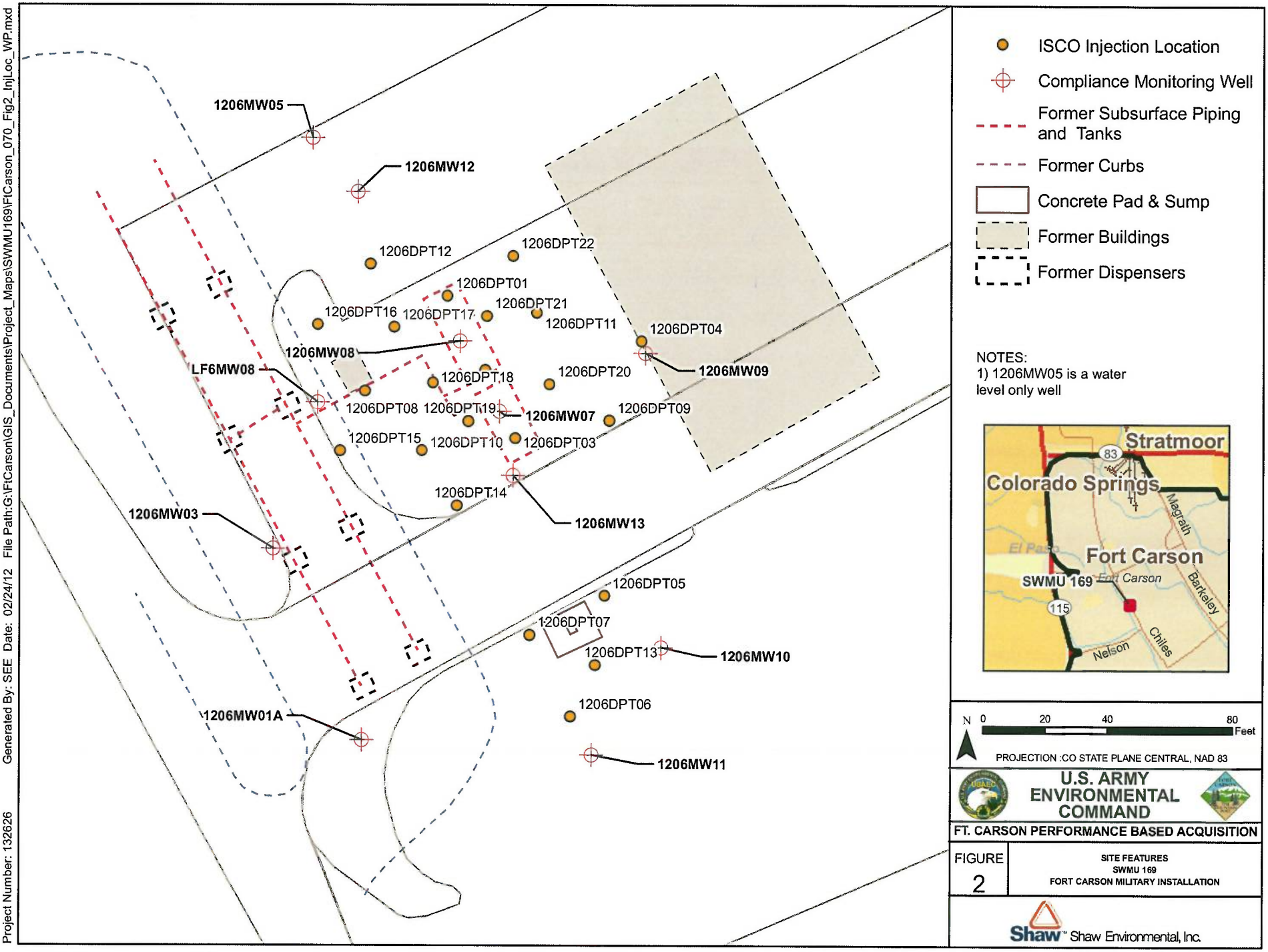
CAD FILE: L:\GROUP\CAD\FTC\QUADS\CHEY_MTN\BLDG1211V8.DGN DATE: 01/6/2007

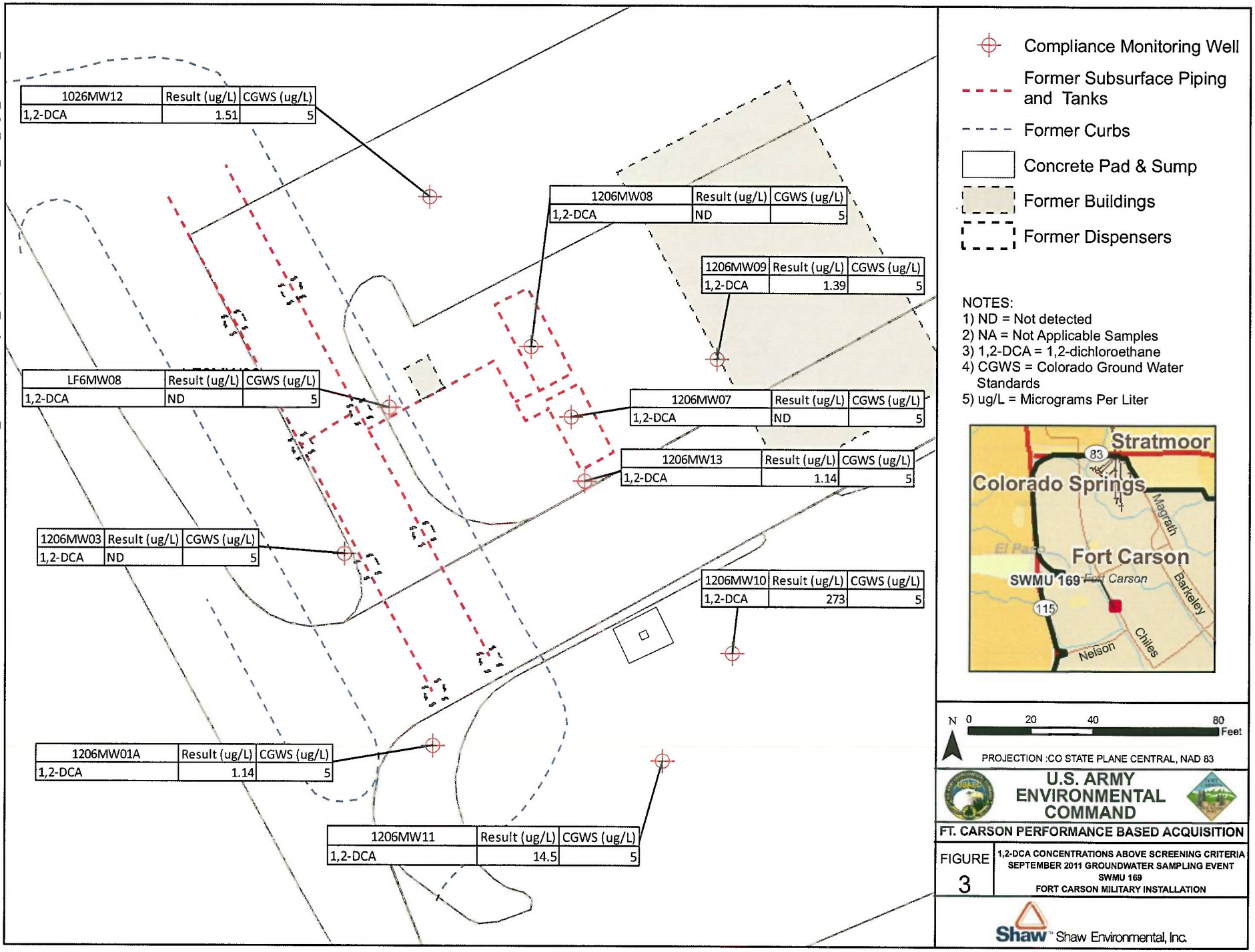
EARTH TECH

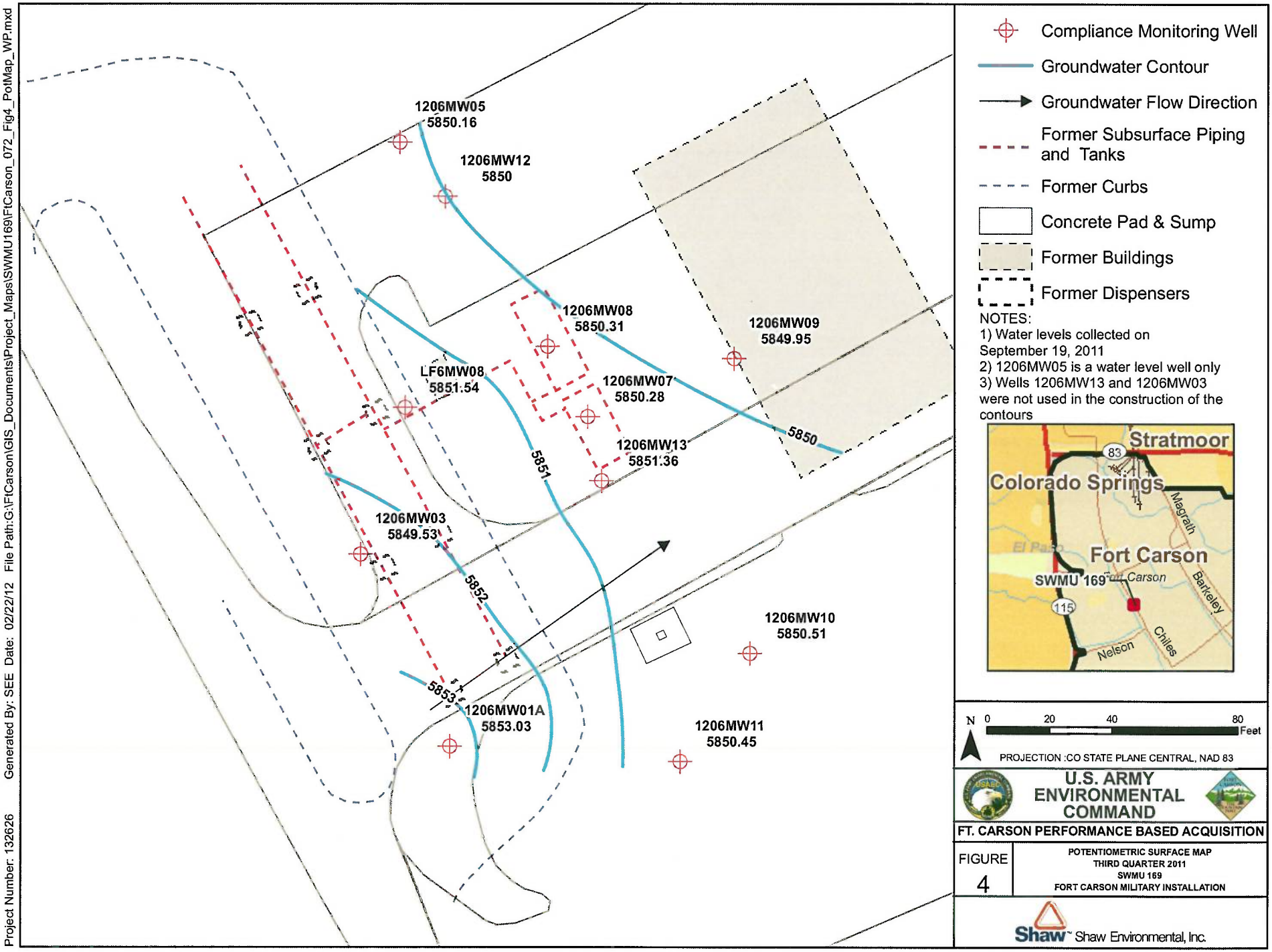
FIGURE 1–2

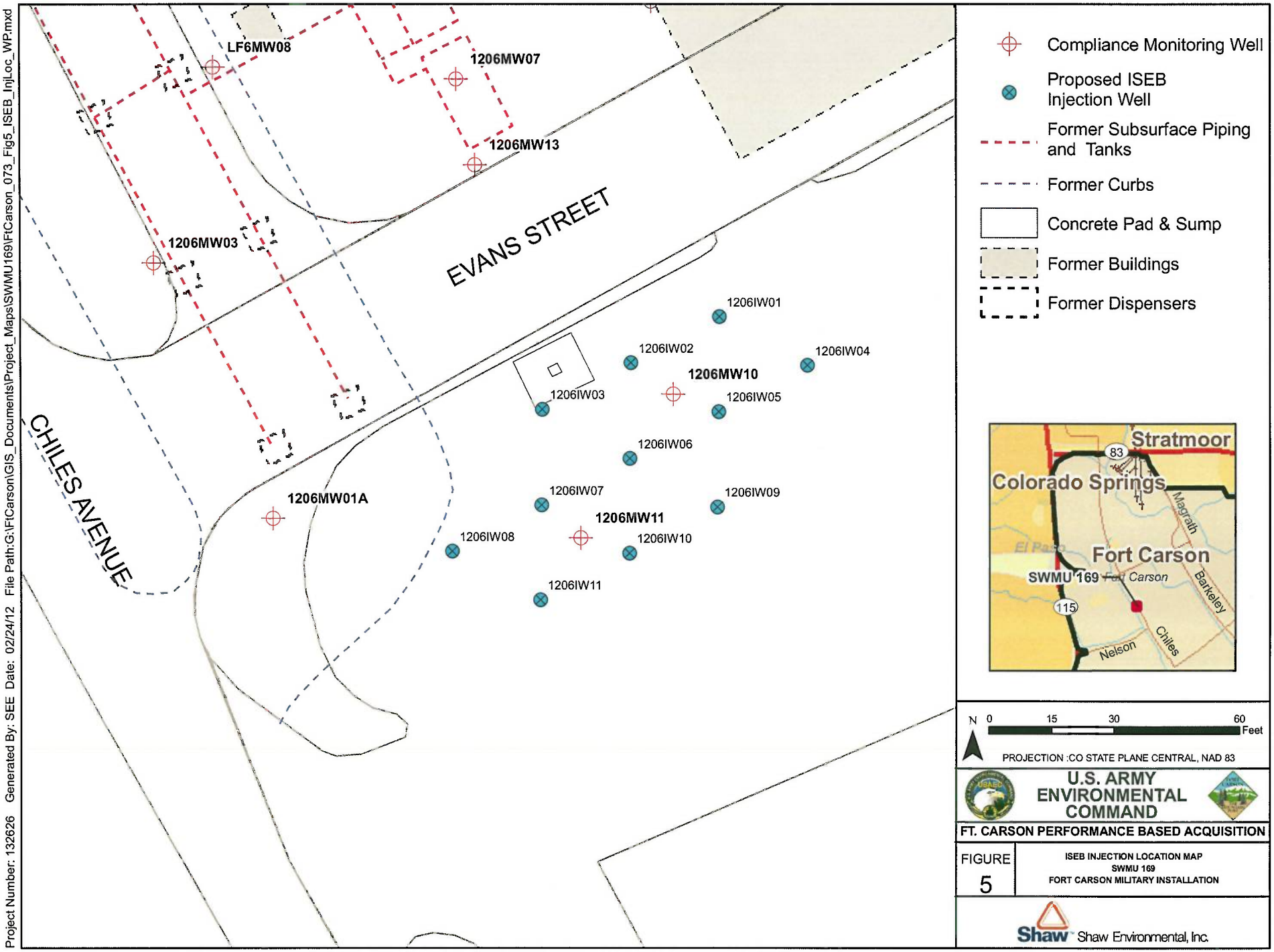
FORMER BLDG 1211
CHEYENNE MOUNTAIN USGS QUADRANGLE

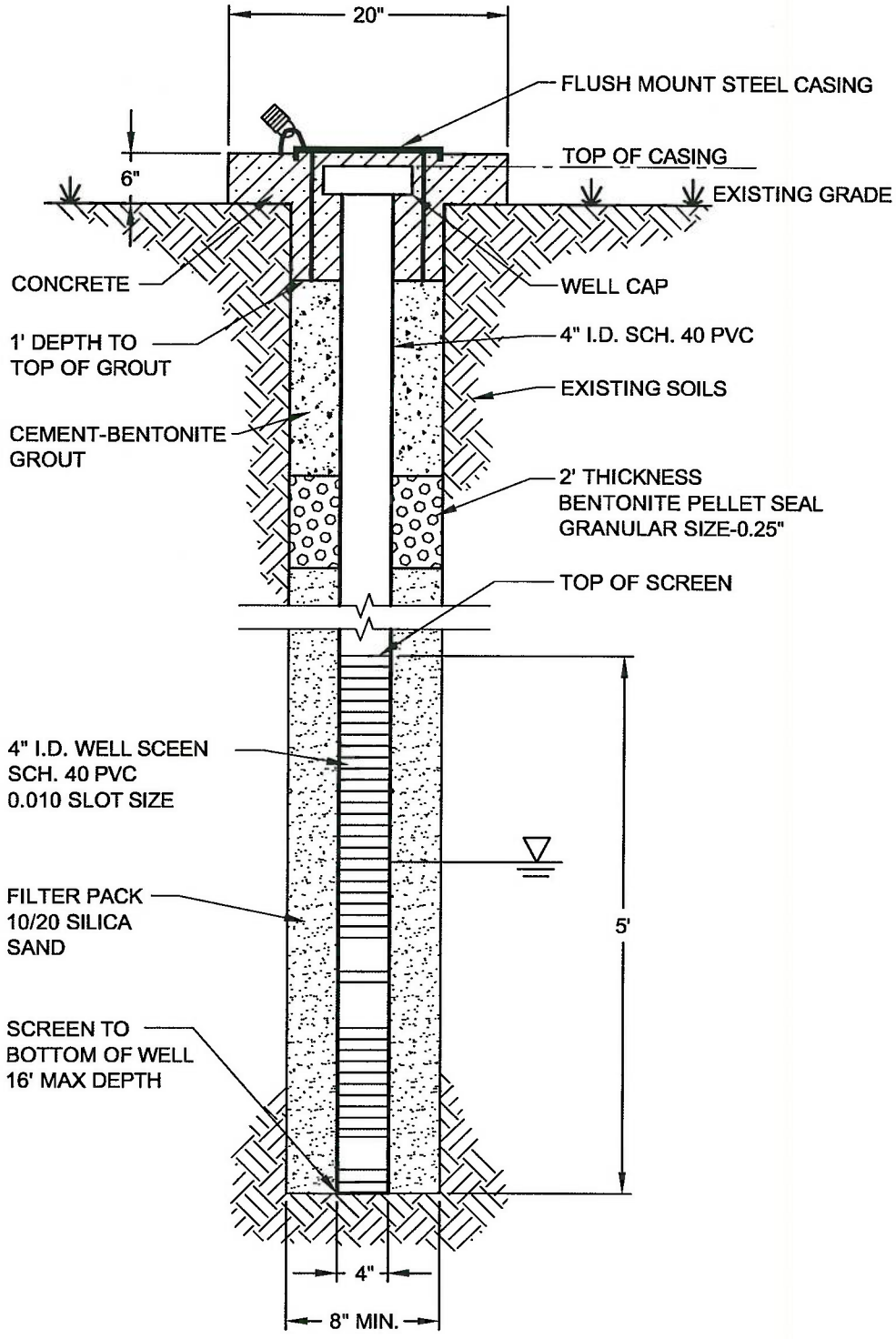
FORT CARSON, COLORADO


1206MW05
1206MW12
1206DPT12
1206DPT22
1206DPT01
1206DPT16
1206DPT17
1206DPT21
1206DPT11
1206DPT04
1206MW08
LF6MW08
1206MW09
1206DPT18
1206DPT20
1206DPT08
1206DPT19
1206MW07
1206DPT09
1206DPT15
1206DPT10
1206DPT03
1206DPT14
1206MW13
1206MW03
1206DPT05
1206DPT07
1206DPT13
1206MW10
1206DPT06
1206MW01A
1206MW11
ISCO Injection Location
Compliance Monitoring Well
Former Subsurface Piping and Tanks
Former Curbs
Concrete Pad & Sump
Former Buildings
Former Dispensers
NOTES:
1) 1206MW05 is a water level only well
Stratmoor
Colorado Springs
Fort Carson
SWMU 169
Magrath
Barkeley
Chiles
Nelson
83
115
N
0
20
40
80
Feet
PROJECTION :CO STATE PLANE CENTRAL, NAD 83
U.S. ARMY ENVIRONMENTAL COMMAND
FT. CARSON PERFORMANCE BASED ACQUISITION
FIGURE 2
SITE FEATURES
SWMU 169
FORT CARSON MILITARY INSTALLATION
Shaw Shaw Environmental, Inc.
Project Number: 132626 Generated By: SEE Date: 02/24/12 File Path:G:\FtCarson\GIS_Documents\Project_Maps\SWMU169\FtCarson_070_Fig2_InjLoc_WP.mxd


1026MW12 | Result (ug/L) | CGWS (ug/L)
1,2-DCA | 1.51 | 5
1206MW08 | Result (ug/L) | CGWS (ug/L)
1,2-DCA | ND | 5
1206MW09 | Result (ug/L) | CGWS (ug/L)
1,2-DCA | 1.39 | 5
LF6MW08 | Result (ug/L) | CGWS (ug/L)
1,2-DCA | ND | 5
1206MW07 | Result (ug/L) | CGWS (ug/L)
1,2-DCA | ND | 5
1206MW13 | Result (ug/L) | CGWS (ug/L)
1,2-DCA | 1.14 | 5
1206MW03 | Result (ug/L) | CGWS (ug/L)
1,2-DCA | ND | 5
1206MW10 | Result (ug/L) | CGWS (ug/L)
1,2-DCA | 273 | 5
1206MW01A | Result (ug/L) | CGWS (ug/L)
1,2-DCA | 1.14 | 5
1206MW11 | Result (ug/L) | CGWS (ug/L)
1,2-DCA | 14.5 | 5
Compliance Monitoring Well
Former Subsurface Piping and Tanks
Former Curbs
Concrete Pad & Sump
Former Buildings
Former Dispensers
NOTES:
1) ND = Not detected
2) NA = Not Applicable Samples
3) 1,2-DCA = 1,2-dichloroethane
4) CGWS = Colorado Ground Water Standards
5) ug/L = Micrograms Per Liter
Stratmoor
Colorado Springs
Fort Carson
SWMU 169
Fort Carson
El Paso
Nelson
Chiles
Barkeley
Magrath
83
115
N
0
20
40
80
Feet
PROJECTION :CO STATE PLANE CENTRAL, NAD 83
U.S. ARMY ENVIRONMENTAL COMMAND
FT. CARSON PERFORMANCE BASED ACQUISITION
FIGURE 3
1,2-DCA CONCENTRATIONS ABOVE SCREENING CRITERIA
SEPTEMBER 2011 GROUNDWATER SAMPLING EVENT
SWMU 169
FORT CARSON MILITARY INSTALLATION
Shaw Shaw Environmental, Inc.
Project Number: 132626 Generated By: SEE Date: 02/24/12 File Path:G:\FtCarson\GIS_Documents\Project_Maps\SWMU169\FtCarson_071_Fig3_ScrnCrit_WP.mxd


1206MW05
5850.16
1206MW12
5850
1206MW08
5850.31
1206MW09
5849.95
LF6MW08
5851.54
1206MW07
5850.28
1206MW13
5851.36
1206MW03
5849.53
1206MW10
5850.51
1206MW01A
5853.03
1206MW11
5850.45
5850
5851
5852
5853
Compliance Monitoring Well
Groundwater Contour
Groundwater Flow Direction
Former Subsurface Piping and Tanks
Former Curbs
Concrete Pad & Sump
Former Buildings
Former Dispensers
NOTES:
1) Water levels collected on September 19, 2011
2) 1206MW05 is a water level well only
3) Wells 1206MW13 and 1206MW03 were not used in the construction of the contours
Stratmoor
Colorado Springs
Fort Carson
SWMU 169
Magrath
Barkeley
Chiles
Nelson
83
115
N
0
20
40
80
Feet
PROJECTION :CO STATE PLANE CENTRAL, NAD 83
U.S. ARMY ENVIRONMENTAL COMMAND
FT. CARSON PERFORMANCE BASED ACQUISITION
FIGURE 4
POTENTIOMETRIC SURFACE MAP
THIRD QUARTER 2011
SWMU 169
FORT CARSON MILITARY INSTALLATION
Shaw Environmental, Inc.
Project Number: 132626 Generated By: SEE Date: 02/22/12 File Path:G:\FtCarson\GIS_Documents\Project_Maps\SWMU169\FtCarson_072_Fig4_PotMap_WP.mxd


LF6MW08
1206MW07
1206MW13
1206MW03
EVANS STREET
CHILES AVENUE
1206MW01A
1206IW01
1206IW02
1206IW04
1206MW10
1206IW03
1206IW05
1206IW06
1206IW07
1206IW09
1206MW11
1206IW08
1206IW10
1206IW11
Compliance Monitoring Well
Proposed ISEB Injection Well
Former Subsurface Piping and Tanks
Former Curbs
Concrete Pad & Sump
Former Buildings
Former Dispensers
Stratmoor
Colorado Springs
Fort Carson
SWMU 169
83
115
Magrath
Barkeley
Chiles
Nelson
N
0
15
30
60
Feet
PROJECTION :CO STATE PLANE CENTRAL, NAD 83
U.S. ARMY ENVIRONMENTAL COMMAND
FT. CARSON PERFORMANCE BASED ACQUISITION
FIGURE 5
ISEB INJECTION LOCATION MAP
SWMU 169
FORT CARSON MILITARY INSTALLATION
Shaw Environmental, Inc.
Project Number: 132626 Generated By: SEE Date: 02/24/12 File Path:G:\FtCarson\GIS_Documents\Project_Maps\SWMU169\FtCarson_073_Fig5_ISEB_InjLoc_WP.mxd



U.S. ARMY ENVIRONMENTAL COMMAND

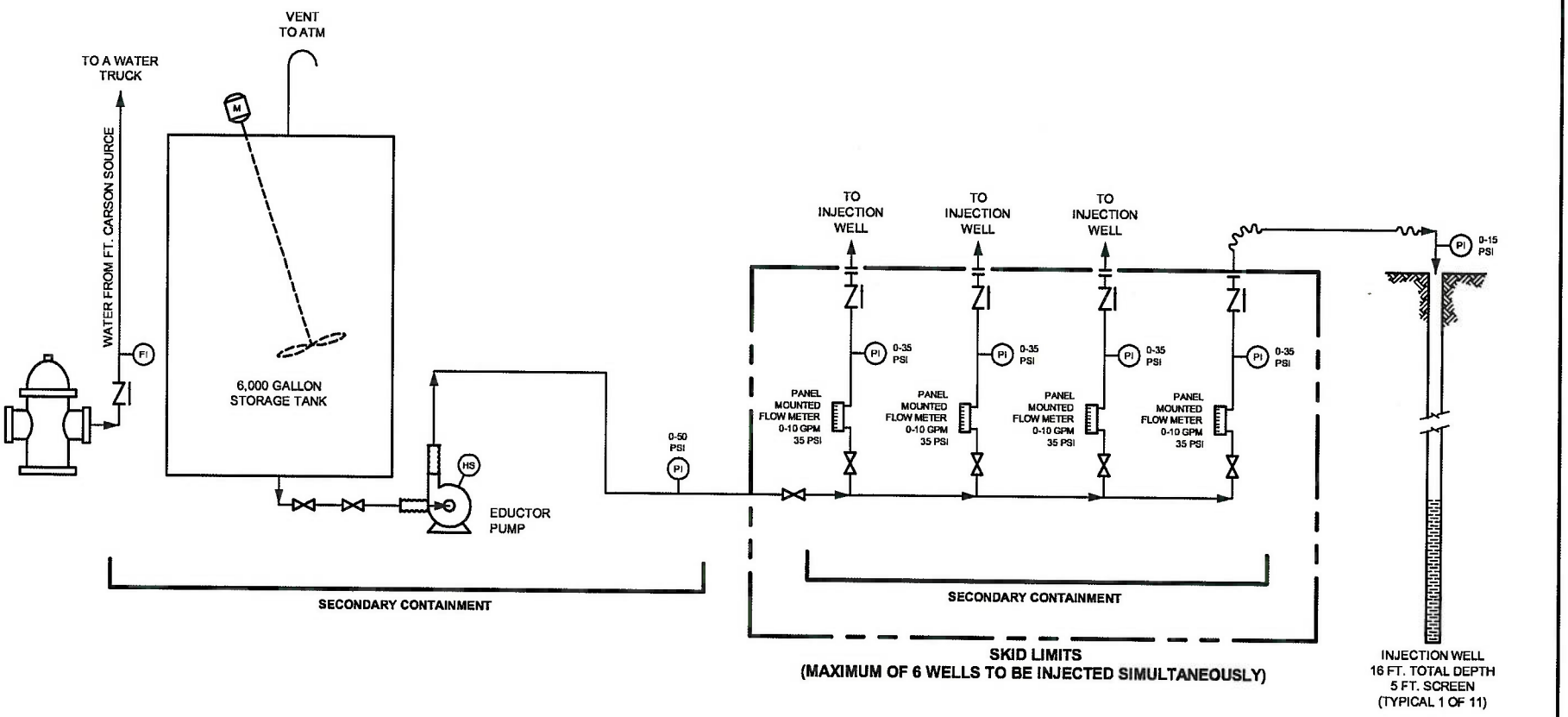
FT. CARSON PERFORMANCE BASED ACQUISITION

FIGURE NUMBER	TYPICAL INJECTION WELL DETAIL SWMU 169 FORT CARSON MILITARY INSTALLATION
6	

"DRAWING NOT TO SCALE"

Shaw a world of Solutions

M. NaJar - FtCarson_0xx_Fig6_swmu169.dwg - Monday, 2/20/12 - 2:45 PM



LEGEND:

VENTURI	QUICK DISCONNECT	HAND SWITCH (ON/OFF)
GATE VALVE	FLEXIBLE JOINT	PRESSURE INDICATOR
CHECK VALVE	FLEXIBLE HOSE	TEMPERATURE INDICATOR
DRAIN	PANEL MOUNTED FLOW METER	FLOW TOTALIZER
		PRESSURE RECORDER

"DRAWING NOT TO SCALE"

U.S. ARMY ENVIRONMENTAL COMMAND

FT. CARSON PERFORMANCE BASED ACQUISITION

FIGURE NUMBER 7

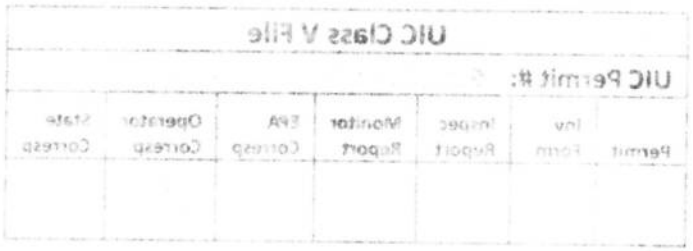
TYPICAL PROCESS FLOW DIAGRAM
SWMU 169
FORT CARSON MILITARY INSTALLATION

Shaw a world of Solutions

M. Najar - FtCarson_0xx_Fig7_swmu169.dwg - Monday, 2/20/12 - 2:46 PM

720.554.8270 Direct
720.862.9425 Cell

Shaw™ a world of Solutions™
www.shawgrp.com



FTC Class V UIC Authorization Change
Gallagher, Patrick M
to:
Howard Urband
01/14/2013 09:52 AM
Hide Details
From: "Gallagher, Patrick M" <patrick.gallagher@shawgrp.com>

To: Howard Urband/R8/USEPA/US@EPA

Howard,

Shaw is requesting the following change to the January 7, 2013 Class V UIC Program Rule Authorization letter for Fort Carson Former Bldg 1211, Chiles Avnenue and Evans Street, Fort Carson, CO:

- Please change "additional injections of sodium persulfate and hydrogen peroxide..." to "additional injections of sodium persulfate and sodium hydroxide..."

If you have any questions, please email or call.

Thanks,
Pat

UIC Class V File						
UIC Permit #: CO50000-02668						
Permit	Inv Form	Inspec Report	Monitor Report	EPA Corresp	Operator Corresp	State Corresp
					X	

Patrick Gallagher
Federal Applied Sciences & Engineering
Shaw Environmental & Infrastructure Group
9201 E. Dry Creek Rd
Centennial, CO 80112

Table 2
Summary of Water Level Information
SWMU 169
Fort Carson, Colorado

Site ID	Date	Total Depth (feet below TOC)	TOC Elevation (feet msl)	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet msl)	Elevation Change (+/- feet)
1206MW01A	01/11/10	18.11	5862.47	12.42	5850.05	--
	03/08/10			12.24	5850.23	0.18
	06/21/10			10.64	5851.83	1.60
	09/21/10			8.63	5853.84	2.01
	12/09/10			10.33	5852.14	-1.70
	03/14/11			11.87	5850.60	-1.54
	06/21/11			10.18	5852.29	1.69
	09/19/11			9.44	5853.03	0.74
	12/13/11			10.32	5852.15	-0.88
1206MW03	01/11/10	14.89	5862.82	12.81	5850.01	--
	03/08/10			13.62	5849.20	-0.81
	06/21/10			12.83	5849.99	0.79
	09/21/10			12.18	5850.64	0.65
	12/09/10			12.54	5850.28	-0.36
	03/14/11			13.55	5849.27	-1.01
	06/21/11			13.79	5849.03	-0.24
	09/19/11			13.29	5849.53	0.50
	12/13/11			13	5849.82	0.29
1206MW05	01/11/10	14.9	5864.22	NM	--	--
	03/08/10			NM	--	--
	06/21/10			NM	--	--
	09/21/10			NM	--	--
	12/09/10			NM	--	--
	03/14/11			14.50	5849.72	--
	06/21/11			14.51	5849.71	-0.01
	09/19/11			14.06	5850.16	0.45
	12/13/11			13.68	5850.54	0.38
1206MW07	01/11/10	14.85	5861.71	11.66	5850.05	--
	03/08/10			9.6	5852.11	2.06
	06/21/10			10.77	5850.94	-1.17
	09/21/10			10.12	5851.59	0.65
	12/09/10			10.7	5851.01	-0.58
	03/14/11			11.75	5849.96	-1.05
	06/21/11			12.13	5849.58	-0.38
	09/19/11			11.43	5850.28	0.70
	12/13/11			11.35	5850.36	0.08
1206MW08	01/11/10	18.08	5862.31	12.36	5849.95	--
	03/08/10			11.25	5851.06	1.11
	06/21/10			11.68	5850.63	-0.43
	09/21/10			10.9	5851.41	0.78
	12/09/10			11.74	5850.57	-0.84
	03/14/11			13	5849.31	-1.26
	06/21/11			12.89	5849.42	0.11
	09/19/11			12	5850.31	0.89
	12/13/11			inaccessible	--	--
1206MW09	01/11/10	13.75	5860.89	11.87	5849.02	--
	03/08/10			11.76	5849.13	0.11
	06/21/10			10.6	5850.29	1.16
	09/21/10			9.74	5851.15	0.86
	12/09/10			10.82	5850.07	-1.08
	03/14/11			12.48	5848.41	-1.66
	06/21/11			11.85	5849.04	0.63
	09/19/11			10.94	5849.95	0.91
	12/13/11			10.62	5850.27	0.32

Table 2
Summary of Water Level Information
SWMU 169
Fort Carson, Colorado

Site ID	Date	Total Depth (feet below TOC)	TOC Elevation (feet msl)	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet msl)	Elevation Change (+/- feet)
1206MW10	01/11/10	12.68	5861.33	11.56	5849.77	--
	03/08/10			10.4	5850.93	1.16
	06/21/10			10.84	5850.49	-0.44
	09/21/10			9.78	5851.55	1.06
	12/09/10			10.97	5850.36	-1.19
	03/14/11			12.23	5849.10	-1.26
	06/21/11			11.73	5849.60	0.50
	09/19/11			10.82	5850.51	0.91
	12/13/11			11.08	5850.25	-0.26
1206MW11	01/11/10	13.99	5861.67	12.54	5849.13	--
	03/08/10			10.35	5851.32	2.19
	06/21/10			11.8	5849.87	-1.45
	09/21/10			10.83	5850.84	0.97
	12/09/10			11.34	5850.33	-0.51
	03/14/11			12.75	5848.92	-1.41
	06/21/11			12.92	5848.75	-0.17
	09/19/11			11.22	5850.45	1.70
	12/13/11			11.76	5849.91	-0.54
1206MW12	01/11/10	13.88	5863.29	13.17	5850.12	--
	03/08/10			12.95	5850.34	0.22
	06/21/10			12.68	5850.61	0.27
	09/21/10			12.17	5851.12	0.51
	12/09/10			12.16	5851.13	0.01
	03/14/11			13.53	5849.76	-1.37
	06/21/11			13.75	5849.54	-0.22
	09/19/11			13.29	5850.00	0.46
	12/13/11			13.01	5850.28	0.28
1206MW13	01/11/10	13.87	5861.48	11.47	5850.01	--
	03/08/10			11	5850.48	0.47
	06/21/10			11.29	5850.19	-0.29
	09/21/10			10.11	5851.37	1.18
	12/09/10			10.93	5850.55	-0.82
	03/14/11			11.4	5850.08	-0.47
	06/21/11			11.84	5849.64	-0.44
	09/19/11			10.12	5851.36	1.72
	12/13/11			11.58	5849.90	-1.46
LF6MW08	01/11/10	13.03	5864	12.59	5851.41	--
	03/08/10			7.9	5856.10	4.69
	06/21/10			11.94	5852.06	-4.04
	09/21/10			11.28	5852.72	0.66
	12/09/10			12.21	5851.79	-0.93
	03/14/11			12.57	5851.43	-0.36
	06/21/11			12.95	5851.05	-0.38
	09/19/11			12.46	5851.54	0.49
	12/13/11			12.75	5851.25	-0.29

Elevations expressed in feet above mean sea level using North American Vertical Datum 1988 (NAVD88).

Elevation change over a 12- and 6-month period.

-- denotes not applicable.

ID denotes identification.

msl denotes above mean sea level.

TOC denotes top of casing.

Table 3
ISEB Injection Parameters
SWMU 169
Fort Carson, Colorado

Extent of Plume	Parameter	Units
Length	60	feet
Width	60	feet
Saturated Thickness	5	feet
Effective Porosity	0.2	
Treatment Zone Pore Volume	3,600	$feet^3$
Treatment Zone Pore Volume	26,928	gallons
Number of points	11	points
Dosing Parameters		
Drums of EOS	2	drums
Total EOS required	110	gallons
EOS per injection well	10.0	gallons
Drums of lactate	1	drums
Total lactate required	55	gallons
Lactate per injection well	5.0	gallons
Water per well*	2,433	gallons
Total volume per well*	2,448	gallons
Total SDC-9 required	5	Liters
SDC-9 volume per well	0.45	Liters
Mixing Carbon Solution		
Total mixing volume	11,000	gallons
Tanks	2.1	tanks
EVO	52	gallons
Lactate	26	gallons
Water	5,163	gallons
Mixing SDC-9 Solution		
Total mixing volume	22	gallons
Tanks	1.0	tanks
Lactate	12	gallons
Water	22	gallons
SDC-9	5	Liters
Duration of Carbon Injection		
Injection points	11	
Simultaneous injection points	6	points
Total volume injected	11,000	gallons
Volume per injection well	1,000	gallons
Injection rate	2	gal/min
Hours of injection per day	8	hours
Hours of injection	15.3	hours
Time of injection	1.9	days
Duration of SDC-9 Injection		
Injection points	11	
Simultaneous injection points	6	points
Total volume injected	22	gallons
Volume per injection well	2	gallons
Injection rate	3	gal/min
Hours of injection per day	8	hours
Hours of injection	0.0	hours
Time of injection	0.0	days

Highlighted cells denotes input parameters.

** denotes not inclusive of SDC-9 water volume requirements.*

** denotes not inclusive of SDC-9 water volume requirements.*

EVO denotes emulsified vegetable oil.

SDC-9 denotes Shaw's Dechlorinating Consortium.

MATERIAL SAFETY DATA SHEET

Sodium Persulfate

MSDS Ref. No.: 7775-27-1
Date Approved: 06/01/2009
Revision No.: 13

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200 and Canada's Workplace Hazardous Materials Information System (WHMIS) requirements.

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	Sodium Persulfate
SYNONYMS:	Sodium Peroxydisulfate; Disodium Peroxydisulfate
GENERAL USE:	Polymerization initiator. Etchant and cleaner in manufacture of printed circuit boards. Booster in hair bleaching formulations in cosmetics. Secondary oil recovery systems as a polymerization initiator and a gel breaker.

MANUFACTURER

FMC CORPORATION
FMC Peroxygens
1735 Market Street
Philadelphia, PA 19103
(215) 299-6000 (General Information)
msdsinfo@fmc.com (Email - General Information)

EMERGENCY TELEPHONE NUMBERS

(303) 595-9048 (Medical - U.S. - Call Collect)

For leak, fire, spill, or accident emergencies, call:
(800) 424-9300 (CHEMTREC - U.S.A. & Canada)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

- White, odorless, crystals
- Oxidizer.
- Decomposes in storage under conditions of moisture (water/water vapor) and/or excessive heat causing release of oxides of sulfur and oxygen that supports combustion. Decomposition could form a high temperature melt. See Section 10 ("Stability and Reactivity").

POTENTIAL HEALTH EFFECTS: Airborne persulfate dust may be irritating to eyes, nose, lungs, throat and skin upon contact. Exposure to high levels of persulfate dust may cause difficulty in breathing in sensitive persons.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%	EC No.	EC Class
Sodium Persulfate	7775-27-1	>99	231-892-1	Xn-O; R8-R22-R36/37/38-R42/43

4. FIRST AID MEASURES

EYES: Flush with plenty of water. Get medical attention if irritation occurs and persists.

SKIN: Wash with plenty of soap and water. Get medical attention if irritation occurs and persists.

INGESTION: Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.

INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, contact a medical doctor.

NOTES TO MEDICAL DOCTOR: This product has low oral toxicity and is not irritating to the eyes and skin. Flooding of exposed areas with water is suggested. For gastric lavage or emesis induction, consider the possible aggravation of esophageal injury, and the expected absence of system effects. Treatment is controlled removal of exposure followed by symptomatic and supportive care.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Deluge with water.

FIRE / EXPLOSION HAZARDS: Product is non-combustible. On decomposition releases oxygen which may intensify fire. Presence of water accelerates decomposition.

FIRE FIGHTING PROCEDURES: Do not use carbon dioxide or other gas filled fire extinguishers; they will have no effect on decomposing persulfates. Wear full protective clothing and self-contained breathing apparatus.

FLAMMABLE LIMITS: Non-combustible

SENSITIVITY TO IMPACT: No data available

SENSITIVITY TO STATIC DISCHARGE: Not available

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Spilled material should be collected and put in approved DOT container and isolated for disposal. Isolated material should be monitored for signs of decomposition (fuming/smoking). If spilled material is wet, dissolve with large quantity of water and dispose as a hazardous waste. All disposals should be carried out according to regulatory agencies procedures.

7. HANDLING AND STORAGE

HANDLING: Use adequate ventilation when transferring product from bags or drums. Wear respiratory protection if ventilation is inadequate or not available. Use eye and skin protection. Use clean plastic or stainless steel scoops only.

STORAGE: Store (unopened) in a cool, clean, dry place away from point sources of heat, e.g. radiant heaters or steam pipes. Use first in, first out storage system. Avoid contamination of opened product. In case of fire or decomposition (fuming/smoking) deluge with plenty of water to control decomposition. For storage, refer to NFPA Bulletin 430 on storage of liquid and solid oxidizing materials.

COMMENTS: VENTILATION: Provide mechanical general and/or local exhaust ventilation to prevent release of dust into work environment. Spills should be collected into suitable containers to prevent dispersion into the air.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
Sodium Persulfate	0.1 mg/m^3 (TWA)		

ENGINEERING CONTROLS: Provide mechanical local general room ventilation to prevent release of dust into the work environment. Remove contaminated clothing immediately and wash before reuse.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Use cup type chemical goggles. Full face shield may be used.

RESPIRATORY: Use approved dust respirator when airborne dust is expected.

PROTECTIVE CLOTHING: Normal work clothes. Rubber or neoprene footwear.

GLOVES: Rubber or neoprene gloves. Thoroughly wash the outside of gloves with soap and water prior to removal. Inspect regularly for leaks.

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	None
APPEARANCE:	White crystals
AUTOIGNITION TEMPERATURE:	Not applicable. No evidence of combustion up to 800°C. Decomposition will occur upon heating.
BOILING POINT:	Not applicable
COEFFICIENT OF OIL / WATER:	Not applicable
DENSITY / WEIGHT PER VOLUME:	Not available
EVAPORATION RATE:	Not applicable (Butyl Acetate = 1)
FLASH POINT:	Non-combustible
MELTING POINT:	Decomposes
ODOR THRESHOLD:	Not applicable
OXIDIZING PROPERTIES:	Oxidizer
PERCENT VOLATILE:	Not applicable
pH:	typically 5.0 - 7.0 @ 25 °C (1% solution)
SOLUBILITY IN WATER:	73 % @ 25 °C (by wt.)
SPECIFIC GRAVITY:	2.6 (H_2O=1)
VAPOR DENSITY:	Not applicable (Air = 1)
VAPOR PRESSURE:	Not applicable

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Heat, moisture and contamination.
STABILITY:	Stable (becomes unstable in presence of heat, moisture and/or contamination).
POLYMERIZATION:	Will not occur
INCOMPATIBLE MATERIALS:	Acids, alkalis, halides (fluorides, chlorides, bromides and iodides), combustible materials, most metals and heavy metals, oxidizable materials, other oxidizers, reducing agents, cleaners, and organic or carbon containing compounds. Contact

with incompatible materials can result in a material decomposition or other uncontrolled reactions.

HAZARDOUS DECOMPOSITION PRODUCTS: Oxygen that supports combustion and oxides of sulfur.

COMMENTS: PRECAUTIONARY STATEMENT: Use of persulfates in chemical reactions requires appropriate precautions and design considerations for pressure and thermal relief.

Decomposing persulfates will evolve large volumes of gas and/or vapor, can accelerate exponentially with heat generation, and create significant and hazardous pressures if contained and not properly controlled or mitigated.

Use with alcohols in the presence of water has been demonstrated to generate conditions that require rigorous adherence to process safety methods and standards to prevent escalation to an uncontrolled reaction.

---

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: Non-irritating (rabbit) [FMC Ref. ICG/T-79.029]

SKIN EFFECTS: Non-irritating (rabbit) [FMC Ref. ICG/T-79.029]

DERMAL LD_{50}: > 10 g/kg [FMC Ref. ICG/T-79.029]

ORAL LD_{50}: 895 mg/kg (rat) [FMC Ref. ICG/T-79.029]

INHALATION LC_{50}: 5.1 mg/l (rat) [FMC Ref. I95-2017]

SENSITIZATION: May be sensitizing to allergic persons. [FMC Ref. ICG/T-79.029]

TARGET ORGANS: Eyes, skin, respiratory passages

ACUTE EFFECTS FROM OVEREXPOSURE: Dust may be harmful and irritating. May be harmful if swallowed.

CHRONIC EFFECTS FROM OVEREXPOSURE: Sensitive persons may develop dermatitis and asthma [Respiration 38:144, 1979]. Groups of male and female rats were fed 0, 300 or 3000 ppm sodium persulfate in the diet for 13 weeks, followed by 5000 ppm for 5 weeks. Microscopic examination of tissues revealed some injury to the gastrointestinal tract at the high dose (3000 ppm) only. This effect is not unexpected for an oxidizer at high concentrations. [Ref. FMC I90-1151, Toxicologist 1:149, 1981].

CARCINOGENICITY:

NTP:	Not listed
IARC:	Not listed
OSHA:	Not listed
OTHER:	ACGIH: Not listed

---

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION:

Bluegill sunfish, 96-hour LC_{50} = 771 mg/L [FMC Study I92-1250]
Rainbow trout, 96-hour LC_{50} = 163 mg/L [FMC Study I92-1251]
Daphnia, 48-hour LC_{50} = 133 mg/L [FMC Study I92-1252]
Grass shrimp, 96-hour LC_{50} = 519 mg/L [FMC Study I92-1253]

CHEMICAL FATE INFORMATION: Biodegradability does not apply to inorganic substances.

---

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Dispose as a hazardous waste in accordance with local, state and federal regulatory agencies.

---

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

PROPER SHIPPING NAME:	Sodium Persulfate
PRIMARY HAZARD CLASS / DIVISION:	5.1 (Oxidizer)
UN/NA NUMBER:	UN 1505
PACKING GROUP:	III
LABEL(S):	5.1 (Oxidizer)
PLACARD(S):	5.1 (Oxidizer)
MARKING(S):	Sodium Persulfate, UN 1505
ADDITIONAL INFORMATION:	Hazardous Substance/RQ: Not applicable

49 STCC Number: 4918733

This material is shipped in 225 lb. fiber drums, 55 lb. poly bags and 1000 - 2200 lb. IBC's (supersacks).

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

PROPER SHIPPING NAME: Sodium Persulfate

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) / INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

PROPER SHIPPING NAME: Sodium Persulfate

OTHER INFORMATION:

Protect from physical damage. Do not store near acids, moisture or heat.

---

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355, APPENDIX A):
Not applicable

SECTION 311 HAZARD CATEGORIES (40 CFR 370):
Fire Hazard, Immediate (Acute) Health Hazard

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370):
The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.: None

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372):
There are no ingredients in this product, which are subject to Section 313 reporting requirements.

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA DESIGNATION & REPORTABLE QUANTITIES (RQ) (40 CFR 302.4):
Unlisted, RQ = 100 lbs., Ignitability

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA INVENTORY STATUS (40 CFR 710):
All components are listed or exempt.

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
RCRA IDENTIFICATION OF HAZARDOUS WASTE (40 CFR 261):
Waste Number: D001

CANADA

WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

Hazard Classification / Division:	C D2A D2B
Domestic Substance List:	All components are listed or exempt.

INTERNATIONAL LISTINGS

Australia (AICS): Listed
China: Listed
Japan (ENCS): (1)-1131
Korea: KE-12369
Philippines (PICCS): Listed
New Zealand: Listed

HAZARD AND RISK PHRASE DESCRIPTIONS:

EC Symbols:	Xn	(Harmful)
	O	(Oxidizer)
EC Risk Phrases:	R8	(Contact with combustible material may cause fire)
	R22	(Harmful if swallowed.)
	R36/37/38	(Irritating to eyes, respiratory system and skin.)
	R42/43	(May cause sensitization by inhalation or by skin contact.)

16. OTHER INFORMATION

HMIS

Health	1
Flammability	0
Physical Hazard	1
Personal Protection (PPE)	J

Protection = J (Safety goggles, gloves, apron & combination dust & vapor respirator)

HMIS = Hazardous Materials Identification System

Degree of Hazard Code:
4 = Severe
3 = Serious
2 = Moderate
1 = Slight
0 = Minimal

NFPA

Health	1
Flammability	0
Reactivity	1
Special	OX

SPECIAL = OX (Oxidizer)

NFPA (National Fire Protection Association)

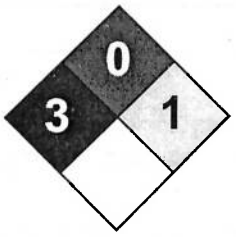
Degree of Hazard Code:
4 = Extreme
3 = High
2 = Moderate
1 = Slight
0 = Insignificant

REVISION SUMMARY:
This MSDS replaces Revision #12, dated April 30, 2006.
Changes in information are as follows:
Section 1 (Product and Company Identification)
Section 3 (Composition / Information on Ingredients)
Section 15 (Regulatory Information)
Section 16 (Other Information)

FMC - Trademark of FMC Corporation

FMC Corporation believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED

OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be applicable where such product is used in combination with any other materials or in any process. It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Further, since the conditions and methods of use are beyond the control of FMC Corporation, FMC Corporation expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.



Health	3
Fire	0
Reactivity	2
Personal Protection	J

Material Safety Data Sheet
Sodium hydroxide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium hydroxide

Catalog Codes: SLS3298, SLS1081, SLS2503, SLS3925, SLS1705

CAS#: 1310-73-2

RTECS: WB4900000

TSCA: TSCA 8(b) inventory: Sodium hydroxide

CI#: Not available.

Synonym: Caustic Soda

Chemical Name: Sodium Hydroxide

Chemical Formula: NaOH

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium hydroxide	1310-73-2	100

Toxicological Data on Ingredients: Sodium hydroxide LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to mucous membranes, upper respiratory tract, skin, eyes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: metals

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions: Not available

Special Remarks on Fire Hazards:
sodium hydroxide + zinc metal dust causes ignition of the latter. Under proper conditions of temperature, pressure and state of division, it can ignite or react violently with acetaldehyde, ally alcohol, allyl chloride, benzene-1,4-diol, chlorine trifluoride, 1,2 dichlorethylene, nitroethane, nitromethane, nitroparaffins, nitropropane, cinnamaldehyde, 2,2-dichloro-3,3-dimethylbutane. Sodium hydroxide in contact with water may generate enough heat to ignite adjacent combustible materials. Phosphorous boiled with NaOH yields mixed phosphines which may ignite spontanously in air. sodium hydroxide and cinnamaldehyde + heat may cause ignition. Reaction with certain metals releases flammable and explosive hydrogen gas.

Special Remarks on Explosion Hazards:
Sodium hydroxide reacts to form explosive products with ammonia + silver nitrate. Benzene extract of allyl benzenesulfonate prepared from allyl alcohol, and benzene sulfonyl chloride in presence of aquesous sodium hydroxide, under vacuum distillation, residue darkened and exploded. Sodium Hydroxde + impure tetrahydrofuran, which can contain peroxides, can

cause serious explosions. Dry mixtures of sodium hydroxide and sodium tetrahydroborate liberate hydrogen explosively at 230-270 deg. C. Sodium Hydroxide reacts with sodium salt of trichlorophenol + methyl alcohol + trichlorobenzene + heat to cause an explosion.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:
Corrosive solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep container dry. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, metals, acids, alkalis, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Hygroscopic. Deliquescent.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
STEL: 2 (mg/m3) from ACGIH (TLV) [United States] TWA: 2 CEIL: 2 (mg/m3) from OSHA (PEL) [United States] CEIL: 2 (mg/m3) from NIOSHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Deliquescent solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 40 g/mole

Color: White.

pH (1% soln/water): 13.5 [Basic.]

Boiling Point: 1388°C (2530.4°F)

Melting Point: 323°C (613.4°F)

Critical Temperature: Not available.

Specific Gravity: 2.13 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, moisture, moist air

Incompatibility with various substances:
Highly reactive with metals. Reactive with oxidizing agents, reducing agents, acids, alkalis, moisture.

Corrosivity: Not available.

Special Remarks on Reactivity:
Hygroscopic. Much heat is evolved when solid material is dissolved in water. Therefore cold water and caution must be used for this process. Sodium hydroxide solution and octanol + diborane during a work-up of a reaction mixture of oxime and diborane in tetrahyrofuran is very exothermic, a mild explosion being noted on one occassion. Reactive with water, acids (mineral, non-oxidizing, e.g. hydrochloric, hydrofluoric acid, muriatic acid, phosphoric), acids (mineral, oxidizing e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), acids (organic e.g. acetic acid, benzoic acid, formic acid, methanoic acid, oxalic acid), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, foraldehyde), carbamates (e.g. carbanolate, carbofuran), esters (e.g. butyl acetate, ethyl acetate, propyl formate), halogenated organics (dibromoethane, hexachlorobenzene, methyl chloride, trichloroethylene), isocyanates (e.g. methyl isocyanate), ketones (acetone, acetophenone, MEK, MIBK), acid chlorides, strong bases, strong oxidizing agents, strong reducing agents, flammable liquids, powdered metals and metals (i.e aluminum, tin, zinc, hafnium, raney nickel), metals (alkali and alkaline e.g. cesium, potassium, sodium), metal compounds (toxic e.g. berylium, lead acetate, nickel carbonyl, tetraethyl lead), mitrides (e.g. potassium nitride, sodium nitride), nitriles (e.g. acetonitrile, methyl cyanide), nitro compounds (organic e.g. nitrobenzene, nitromethane), acetic anhydride, chlorohydrin, chlorosulfonic acid, ethylene cyanohydrin, glyoxal, hydrosulfuric acid, oleum, propiolactone, acylonitrile, phorosous pentoxide, chloroethanol, chloroform-methanol, tetrahydroborate, cyanogen azide, 1,2,4,5 tetrachlorobenzene, cinnamaldehyde. Reacts with formaldehyde hydroxide to yield formic acid, and hydrogen.

Special Remarks on Corrosivity: Very caustic to aluminum and other metals in presence of moisture.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. May cause damage to the following organs: mucous membranes, upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:
Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LDL [Rabbit] - Route: Oral; Dose: 500 mg/kg

Special Remarks on Chronic Effects on Humans: May affect genetic material. Investigation as a mutagen (cytogenetic analysis)

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sodium hydroxide, solid UNNA: 1823 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Illinois toxic substances disclosure to employee act: Sodium hydroxide Illinois chemical safety act: Sodium hydroxide New York release reporting list: Sodium hydroxide Rhode Island RTK hazardous substances: Sodium hydroxide Pennsylvania RTK: Sodium hydroxide Minnesota: Sodium hydroxide Massachusetts RTK: Sodium hydroxide New Jersey: Sodium hydroxide Louisiana spill reporting: Sodium hydroxide California Director's List of Hazardous Substances: Sodium hydroxide TSCA 8(b) inventory: Sodium hydroxide CERCLA: Hazardous substances.: Sodium hydroxide: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS E: Corrosive solid.

DSCL (EEC):
R35- Causes severe burns. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37/39- Wear suitable gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 06:32 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Dunker, Eric

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT CARSON
1626 ELLIS STREET, SUITE 200
FORT CARSON, CO 80913

JUL 18 2012

REPLY TO
ATTENTION OF

July 10, 2012

Directorate of Public Works

U.S. EPA, Region 8
Craig Boomgaard
Mail Code: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129

Dear Mr. Boomgaard:

This letter is to update you on Class V UIC Program approvals for EPA File numbers CO50000-08656, CO50000-08654, & CO50000-08668. These three projects were given EPA's written approval in November 2009. Enclosed find copies of the approval letters and maps from the original documents in 2009. Also enclosed is a short report generated by the contractor (Shaw) detailing the actual constructed wells, along with the injected fluids. Note that the injected fluids are essentially identical to that noted in your approval letters. Also note that the wells installed have some differences in number and/or locations from the original maps and/or your approval letters.

Any questions regarding this information should be directed to Mr. Eric Dunker, P.E. at (719) 526-2022 or email eric.w.dunker.ctr@mail.mil.

Respectfully submitted,

Harold Noonan
Water Programs Manager

Enclosures

UIC Class V File						
UIC Permit #: CO50000-08668						
Permit	Inv Form	Inspec Report	Monitor Report	EPA Corresp	Operator Corresp	State Corresp
					X	

Shaw®
a world of Solutions™

May 22, 2012

Mr. Harold Noonan
Directorate of Public Works –
Environmental Division
1626 Evans Street, Bldg 1219
Fort Carson, CO 80913-4362

Subject: Information Request, Injection Sites, SWMU 164, SWU 168, and SWMU 169

Dear Mr. Noonan,

This letter is to provide the information requested in the April 11, 2012 email from you to Diane Frost. The requested information applies to each Fort Carson SWMU with injection wells. At this time, this request is applicable for SWMU 164, SWMU 168, and SWMU 169. The following information is requested:

1) Descriptive physical location information to include the applicable SWMU number
2) Complete GIS location information to include:
   Township, Range, Section, Quarter Section, Quarter/Quarter Section
   Latitude and Longitude in degrees, minutes, seconds
   UTM Easting and Northing
3) Descriptions of well characteristics, remediation activities and desired outcomes
4) Narrative descriptions of system construction and subsurface details
5) A drawing of the Solid Waste Management Unit showing the location of the injection wells
6) A separate vertical cross-section drawing showing the details of the injection wells and relevant subsurface hydrogeology
7) Provide a narrative describing the fluids to be injected
8) Provide material safety data sheets for any chemical agents added to the injection fluids

SWMU 164

1) Descriptive physical location information to include the applicable SWMU number - Former Building 202, Underground Storage Tank (FTC-070/SWMU 164)

2) Complete GIS location information -

SW ¼ NW ¼ Section 9 Township 15 South Range 66 West 6th PM
X = 517899.197941 UTM (Easting)
Y = 4290304.67468 UTM (Northing)
Latitude: 38 deg 45 min 40.536 sec
Longitude: -104 deg 47 min 38.346 sec

3) Descriptions of well characteristics, remediation activities and desired outcomes - Eleven injection wells were installed at SWMU 164 in April 2012. Each well was constructed in an 8-inch minimum diameter boring with 4-inch inside diameter continuous-wrapped 0.010-inch slot screen and 4-inch inside diameter riser composed of Schedule 40 polyvinyl chloride (PVC) pipe. The screen interval is from 5 to 20 ft bgs for each injection well.

9201 E. DRY CREEK ROAD, CENTENNIAL, CO 80112
720.741.7700 • FAX 720.554.8298

- Shaw presumed porosity values for the site based on the RFI (URS 2008) boring logs. The unconsolidated material consisting of silt and clay is expected to have a porosity ranging from 0.2 to 0.5 and the Pierre shale is expected to have a lower porosity in the 0.05 to 0.2 range (Freeze and Cherry 1979). Porosity is expected to be much greater in the fill material located in the former excavation as compared to the surrounding media.

- Based on comparison of the RFI (URS 2008) boring logs to published data for equivalent media, the hydraulic conductivity is expected to be in $1x10^{-6}$ centimeter per second (cm/sec) to $1x10^{-2}$ cm/sec range for the Pierre shale and $1x10^{-9}$ cm/sec to $1x10^{-6}$ cm/sec for the unconsolidated silt and clay (Bear 1972).

5) A drawing of the Solid Waste Management Unit showing the location of the injection wells – Provided as Figure 1 (attached).

6) A separate vertical cross-section drawing showing the details of the injection wells and relevant subsurface hydrogeology – Provided as Figure 6-2 (attached).

7) Provide a narrative describing the fluids to be injected – The remedial oxidant consists of a three percent solution (by weight) of potassium permanganate. Each injection wells is to receive a total of 3,588 gallons of a three percent by weight $KMnO_4$ solution resulting in a total volume of 39,468 gallons of oxidant into the treatment area.

8) Provide material safety data sheets for any chemical agents added to the injection fluids – Provided as an attachment.

SWMU 168

1) Descriptive physical location information to include the applicable SWMU number - Former Prisoner of War Camp (FTC-093/SWMU 168)

2) Complete GIS location information –

NW ¼ NW ¼ Section 8 Township 15 South Range 66 West 6th PM
X = 516603.164752 UTM (Easting)
Y = 4290442.03261 UTM (Northing)
Latitude: 38 deg 45 min 45.1044 sec
Longitude: -104 deg 48 min 32.033 sec

3) Descriptions of well characteristics, remediation activities and desired outcomes - Three injection wells were installed at SWMU 168 in April 2012. Each injection well was constructed in an 8-inch minimum diameter boring with 4-inch inside diameter continuous-wrapped 0.010-inch slot screen and 4-inch inside diameter riser composed of Schedule 40 polyvinyl chloride (PVC) pipe. The screen interval is from 5 to 20 ft bgs for each injection well.

The objective of the remedy is to utilize groundwater flow at SWMU 168 to move the three percent by weight potassium permanganate solution throughout the saturated zone of the treatment area. A total of three injection wells installed at the upgradient side of the treatment area are to receive a total of 2,466 gallons of the three percent by weight potassium permanganate solution resulting in a total volume of 7,398 gallons of oxidant into the treatment area. The calculated oxidant volume is based on a treatment area of 330 square feet with a 15-foot

range (Freeze and Cherry, 1979). Based on comparison of the *RFI* report (URS, 2009) boring logs to published data for equivalent media, the hydraulic conductivity is expected to be in the $1x10^{-6}$ to $1x10^{-2}$ centimeter per second (cm/sec) range for the Pierre Shale and in the $1x10^{-2}$ to 1 cm/sec range for the fill material (Bear, 1972).

PCP concentrations in groundwater were detected exceeding the CGWS in one monitoring well, POWDP08, which is located in the north end of the excavation pit. The most recent groundwater analytical results (2006) reported PCP concentrations of 6.6 micrograms per liter (µg/L) in monitoring well POWDP08, exceeding the CGWS of 1 µg/L (Figure 2-2). Monitoring well POWDP08 has since been abandoned and groundwater at this location is no longer available.

5) A drawing of the Solid Waste Management Unit showing the location of the injection wells – Figure is attached.

6) A separate vertical cross-section drawing showing the details of the injection wells and relevant subsurface hydrogeology – Provided as Figure 3-2 (attached).

7) Provide a narrative describing the fluids to be injected – The remedial oxidant consists of a three percent solution (by weight) of potassium permanganate.

8) Provide material safety data sheets for any chemical agents added to the injection fluids – Provided as an attachment.

SWMU 169

1) Descriptive physical location information to include the applicable SWMU number - Former Building 1211 Underground Storage Tank Site (FTC-088/SWMU 169)

2) Complete GIS location information –

SE ¼ NE ¼ Section 17 Township 15 South Range 66 West 6th PM
X = 517632.501913 UTM (Easting)
Y = 4288466.23575 UTM (Northing)
Latitude: 38 deg 44 min 40.9272 sec
Longitude: -104 deg 47 min 49.578 sec

3) Descriptions of well characteristics, remediation activities and desired outcomes - Eighteen injection wells were installed at SWMU 169 in April 2012. Twelve injection wells are planned to be installed ten feet apart, based on an anticipated minimum five foot radius of influence (ROI) within the former underground storage tank (UST) pits. Three injection wells are planned to be installed on a five foot ROI upgradient of well LF6MW08 and three injection wells are planned to be installed on a five foot ROI upgradient of well 1206MW12. The ROI is based on previous experience gained from the injection event at SWMU 169 and on the design modification to a gravity feed delivery system. Each well was constructed in an 8-inch minimum diameter boring with 4-inch inside diameter continuous-wrapped 0.010-inch slot screen and 4-inch inside diameter riser composed of Schedule 40 polyvinyl chloride (PVC) pipe. The screen interval is from 4 to 18 ft bgs for each injection well.

The treatment area at SWMU 169 is identified as the former UST pits and the area surrounding wells 1206MW12 and LF6MW08 presented. A total of twelve injection wells installed within the former UST pits are to receive a total of 1,570 gallons of an approximate 11.8% solution of sodium persulfate including a 50% sodium hydroxide solution resulting in a total volume of 18,850 gallons of oxidant into the former UST area. The calculated oxidant

Groundwater flow at SWMU 169 does not conform to the expected general flow direction to the south, southeast in this area of FTC. This local phenomenon is likely related to slight groundwater mounding caused by the former UST tank excavation into underlying bedrock. The groundwater mounding in the excavation areas may explain the radial groundwater flow pattern at and around the former excavation (Figure 3-1).

Shaw estimated porosity values for the site based on the RFI boring logs and the recorded media type. The unconsolidated material consisting of silt and clay is expected to have a porosity ranging from 0.2 to 0.5 and the Pierre shale is expected to have a lower porosity in the 0.05 to 0.2 range. The fill material, media grain sand, is expected to have porosity of 0.3 to 0.4. Based on comparison of the RFI boring logs to published data for equivalent media, the hydraulic conductivity is expected to be in $1x10^{-6}$ to $1x10^{-2}$ centimeter per second (cm/sec) range for the Pierre shale and $1x10^{-6}$ to $1x10^{-9}$ cm/sec for the unconsolidated silt and clay (Fett, 2000). Hydraulic conductivity of $9.38x10^{-4}$ cm/sec was measured in 1206MW01, which screens both clay and Pierre shale layers (Earth Tech, 2008). Based on the boring logs of the two monitoring wells located with the former tanked excavation area, the media and fine sand is expected to exhibit hydraulic conductivity range from $1x10^{-3}$ to $1x10^{-1}$ cm/sec. The fill material at excavation area should demonstrate higher hydraulic conductivity than the surrounding media.

5) A drawing of the Solid Waste Management Unit showing the location of the injection wells – Provided as Figure 2 (attached).

6) A separate vertical cross-section drawing showing the details of the injection wells and relevant subsurface hydrogeology – Provided as Figures 5-1 and 5-2 (attached).

7) Provide a narrative describing the fluids to be injected – The remedial oxidant consists of an 11.8% sodium persulfate solution activated by a 50% sodium hydroxide solution.

8) Provide material safety data sheets for any chemical agents added to the injection fluids – Provided as an attachment.

14751 - R8 UIC-V

CO 50000 - 08668

Shaw Environmental, Inc.
100 Technology Center Drive
Stoughton, MA 02072
PHONE: 617.589.5111
FAX: 617.589.2160

Shaw® Shaw Environmental, Inc.

October 21, 2009

To: Ms. Valois Shea
EPA Region 8
1595 Wynkoop Street
8P-W-GW
Denver, Colorado 80202-1129

cc: Kathie Englert, USACE
Terry Samson, USACE
Mona Douillard, Fort Carson
Deb Anderson, CDPHE
File

Subject: Underground Injection Control Authorization
Former Building 1211 Underground Storage Tank (FTC-088/SWMU 169)
Fort Carson Military Installation, Fort Carson, Colorado

Shaw Tracking Number: SHAW-FTC-109

Dear Ms. Shea:

Shaw Environmental, Inc. on behalf of the Fort Carson Military Installation (FTC), as authorized by the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (CDPHE), is providing this letter to satisfy the requirements for obtaining a Class V Underground Injection Control rule authorization to perform chemical oxidation injections at the former Building 1211 Underground Storage Tank site (FTC-088/Solid Waste Management Unit [SWMU] 169) located on FTC.

The following is the information requested in the *Site Information Request Fact Sheet*:

Property owner:
Department of the Army
United States Army Installation Management Command
Headquarters, United States Army Garrison, Fort Carson
1626 Ellis Street, Suite 200
Fort Carson, Colorado 80913
P: 719.526.1241
F: 719.526.2120

UIC Class V File				
UIC PERMIT & ID #:_____				
Invent. Form	Inspect. Rep.	Monit. Reports	EPA Corres.	Operator Corres.

Operator of facility:
Department of the Army
United States Army Installation Management Command
Headquarters, United States Army Garrison, Fort Carson
1626 Ellis Street, Suite 200
Fort Carson, Colorado 80913
P: 719.526.1241
F: 719.526.2120

Responsible party for the operation, maintenance, and closure of the injection system:

Shaw Environmental Inc.
David Cobb
Senior Project Manager
100 Technology Center Drive
Stoughton, Massachusetts 02072
P: 617.589.5561
F: 617.589.2160
M: 508.667.3608

Shaw Environmental Inc.
Jon Kaibel
Construction Field Manager
348 North Specker Avenue
Fort Carson, Colorado 80913
P: 719.576.2098
F: 719.576.2412
M: 719.330.6463

Name of facility and physical location:

The site is consists of an asphalt paved and concrete parking lot and grass covered areas associated with Building 1203 located in the northern portion of the cantonment area at Fort Carson. The site is located at the intersection of Chiles Avenue and Evans Street and is referred to as former Building 1211 Underground Storage Tank, Fort Carson Site Number 088 / SWMU 169. Fort Carson is a Department of the Army facility located between Colorado Springs and Pueblo, Colorado, to the west of Interstate 25.

Map of site including contaminant plume, proposed injection locations and proposed or existing monitoring wells:

A map of the site with the requested information is included as an attachment to this letter (Figure 6-1).

Is this a proposed or existing system?

The chemical oxidation remediation system is proposed. However, the work plan has been approved by FTC and CDPHE.

Colorado State Agency authorizing site cleanup:

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
Ms. Deb Anderson
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530
P: 303.692.3379

Description of contamination and when it occurred:

Two former underground storage tanks (USTs) and eight dispenser pumps located at SWMU 169 are the likely source for soil and groundwater contamination. Soil is impacted with polynuclear aromatic hydrocarbons (PAHs) from approximately 8 to 12 feet below ground surface within the former tank pits.

Groundwater is impacted with 1,2-dichloroethane (1,2-DCA), benzene, bis(2-ethylhexyl)phthalate, vinyl chloride and PAHs. Maximum contaminant concentrations in soil and groundwater are presented on Figures 2-2 and 2-3, respectively.

Type of proposed injection wells:
Shaw has proposed installing 12 direct-push technology (DPT) temporary wells to deliver chemical oxidants into the groundwater table at SWMU 169. The DPT injection well depths are not to exceed 14 feet below ground surface (bgs).

Description of the proposed injectate:
Shaw has proposed injecting sodium persulfate activated with 50% sodium hydroxide into the subsurface at SWMU 169. Sodium persulfate is a strong oxidizer and should effectively treat the contaminants of concern in groundwater. Approximately 16,613 pounds of dry sodium persulfate and 1,042 gallons of 50% sodium hydroxide will be mixed with 14,623 gallons of potable water to create an 11.8 percent solution (by weight). The source of the potable water to be used during injection activities will be approved by FTC and CDPHE prior to use.

Hydrogeologic description, location, depth, and current use (if any) of the receiving formations:
The receiving formation at SWMU 169 consists of coarse grained fill material above bedrock (Pierre Shale) in the location of the former tank pits. Weathered bedrock was encountered at the site between 3 and 14 feet bgs. Bedrock was deepest within the former tank pits indicating that the excavation reached into the weathered Pierre Shale. Depth to water throughout SWMU 169 ranges from approximately 4.6 feet to 13.7 feet. Depth to water in the tank pits is approximately 9.2 to 9.8 feet bgs. Groundwater flow at SWMU 169 appears to be to the southwest with a slight southeast component with an exception around the former tank pits source area, which seems to have a radial flow direction. Estimated porosity values for the site are based on previously installed boring logs and the recorded media type. The fill material is expected to have a porosity of 0.3 to 0.4 and the Pierre Shale bedrock is expected to have a lower porosity in the 0.05 to 0.2 range. The hydraulic conductivity is expected to be in the $1x10^{-6}$ to $1x10^{-2}$ cm/sec for the Pierre Shale. Hydraulic conductivity of $9.38x10^{-4}$ cm/sec was measured in monitoring well 1206MW01. The fill material is expected to demonstrate higher hydraulic conductivity than the surrounding media.

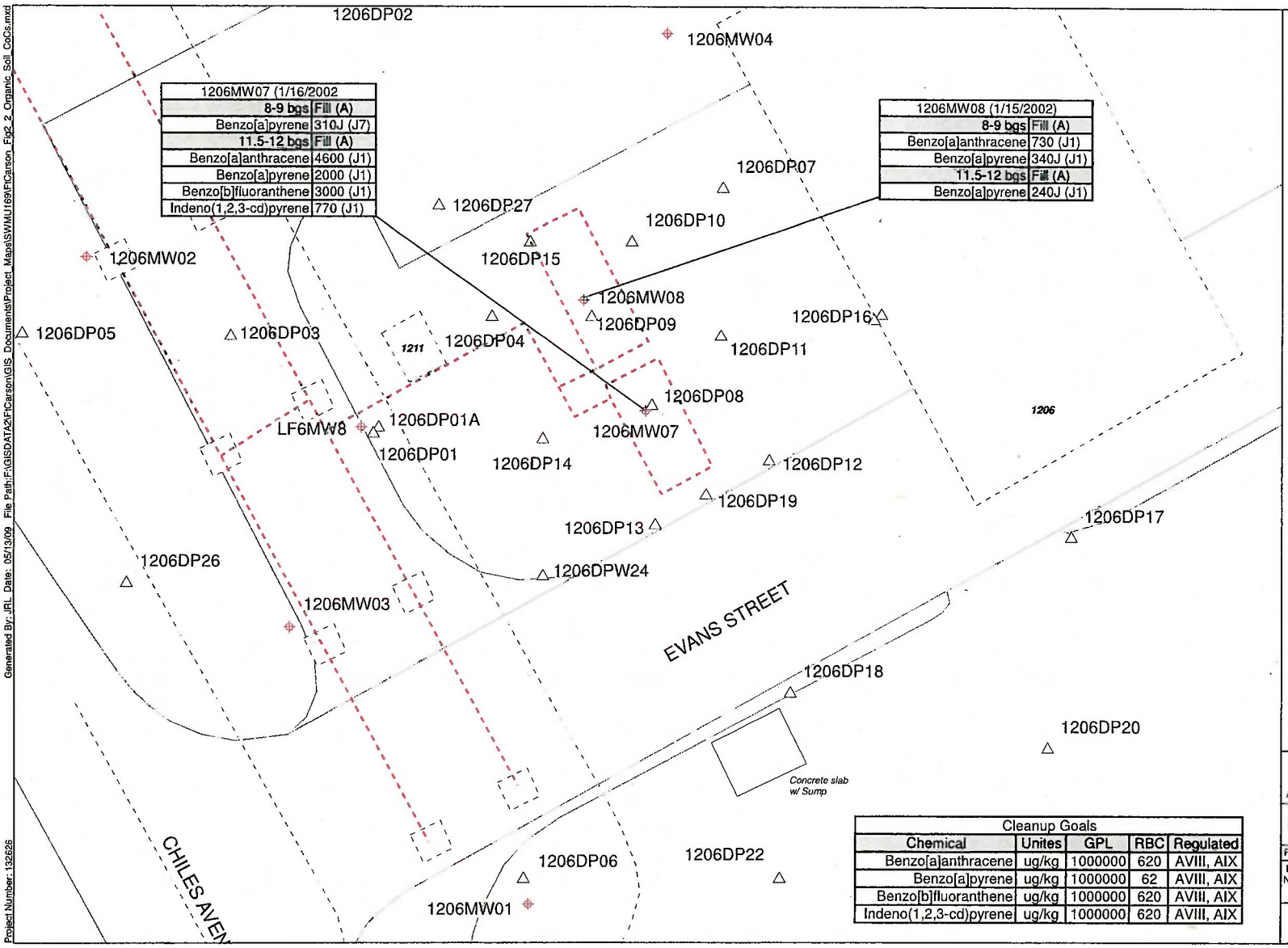
Estimation of time frame for when injection activities will begin and end:
Shaw estimates injection activities to begin in November 2009 and take approximately 1 week.

If you have any questions, please do not hesitate to contact me at 617.589.5561.

Very Truly Yours,
Shaw Environmental, Inc.

David Cobb
Senior Project Manager

Attachment



LEGEND

- Former Buildings
- Former Dispensers
- Direct Push
- Monitoring Well
- Former Curbs
- Former Subsurface Piping and Tanks

NOTES:

1) Soil samples were not collected from borings 1206DP16 through 1206DP18 and 1206DP20 through 1206DP26.

bgs - below ground surface
GPL - Groundwater Protection Level
RBC - Risk-Based Concentration
ug/kg - micrograms per kilogram
A-Alluvium
J1 - Estimated detection based on surrogate recovery outside control limits.
J7 - Estimated detection based on internal standard area count outside control limits.
AVIII - 6CCR, 1007-3, 261, Appendix VIII list.
AIX - 6CCR, 1003-3, 264, Appendix IX list.

Cleanup Goals				
Chemical	Unites	GPL	RBC	Regulated
Benzo[a]anthracene	ug/kg	1000000	620	AVIII, AIX
Benzo[a]pyrene	ug/kg	1000000	62	AVIII, AIX
Benzo[b]fluoranthene	ug/kg	1000000	620	AVIII, AIX
Indeno(1,2,3-cd)pyrene	ug/kg	1000000	620	AVIII, AIX

N 0 10 20 40 Feet

PROJECTION :CO STATE PLANE CENTRAL, NAD 83
SCALE 1 : 240 ONE INCH = 20 FEET

U.S. ARMY ENVIRONMENTAL COMMAND

FT. CARSON PERFORMANCE BASED ACQUISITION

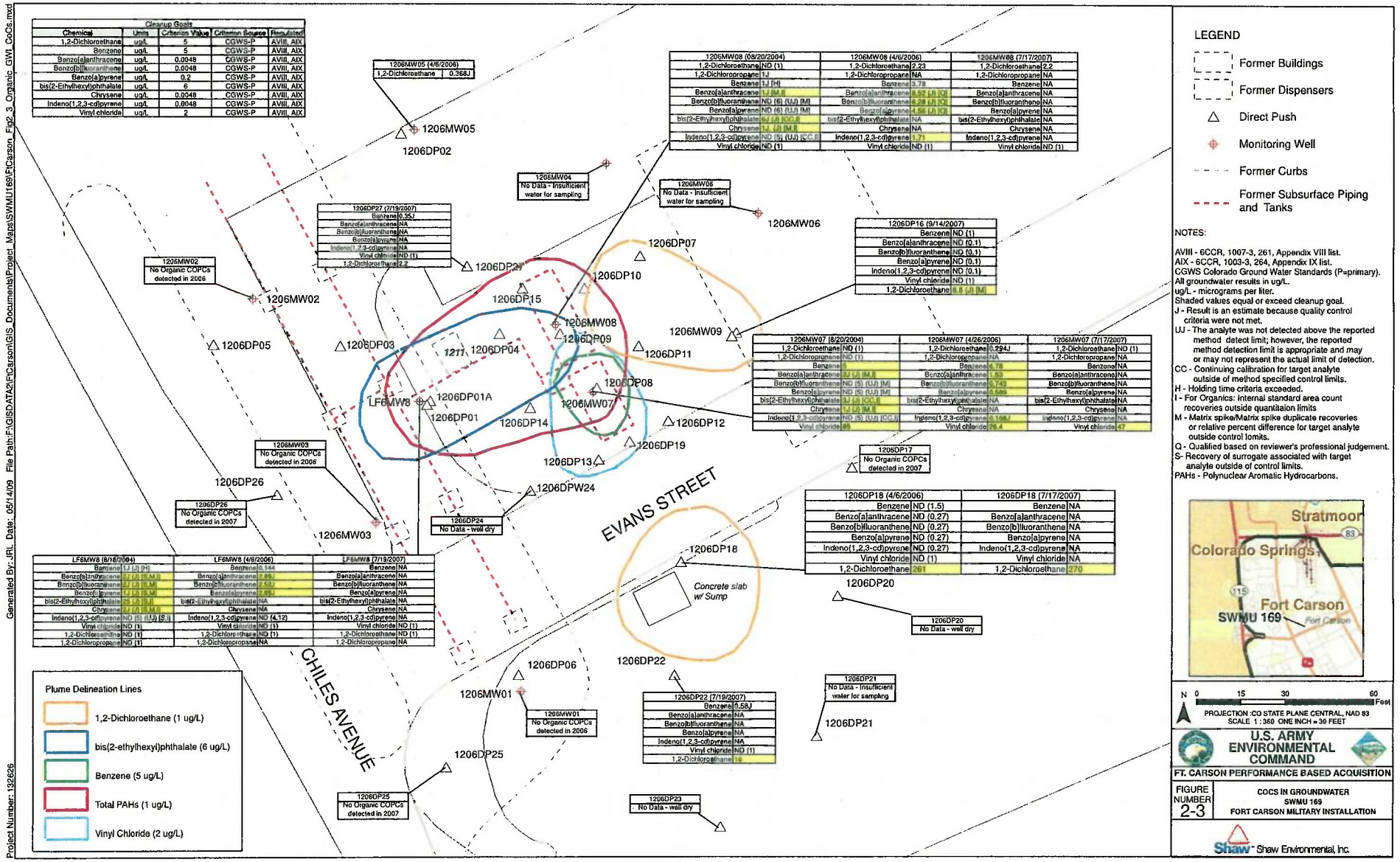
FIGURE NUMBER 2-2

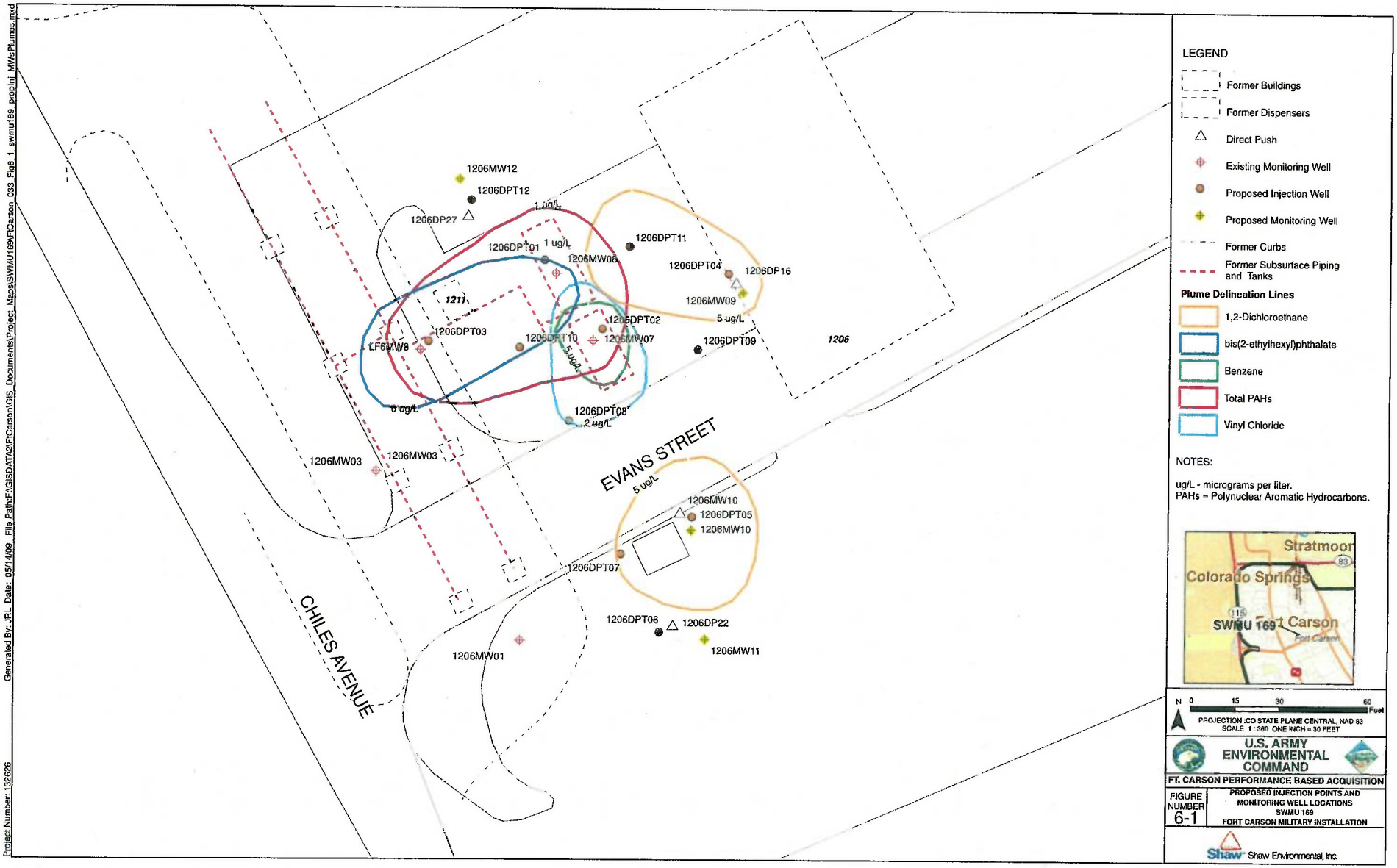
COCS IN SOIL
SWMU 169
FORT CARSON MILITARY INSTALLATION

Shaw - Shaw Environmental, Inc.

Generated By: JRL Date: 05/13/09 File Path:F:\GISDATA2\FtCarson\GIS_Documents\Project_Maps\SWMU169\FtCarson_Fig2_2_Organic_Soil_CoCs.mxd

Project Number: 132626


Cleanup Goals
Chemical | Units | Criterion Value | Criterion Source | Regulated
1,2-Dichloroethane | ug/L | 5 | CGWS-P | AVIII, AIX
Benzene | ug/L | 5 | CGWS-P | AVIII, AIX
Benzo[a]anthracene | ug/L | 0.0048 | CGWS-P | AVIII, AIX
Benzo[b]fluoranthene | ug/L | 0.0048 | CGWS-P | AVIII, AIX
Benzo[a]pyrene | ug/L | 0.2 | CGWS-P | AVIII, AIX
bis(2-Ethylhexyl)phthalate | ug/L | 6 | CGWS-P | AVIII, AIX
Chrysene | ug/L | 0.0048 | CGWS-P | AVIII, AIX
Indeno(1,2,3-cd)pyrene | ug/L | 0.0048 | CGWS-P | AVIII, AIX
Vinyl chloride | ug/L | 2 | CGWS-P | AVIII, AIX
1206MW05 (4/6/2006)
1,2-Dichloroethane 0.368J
1206MW05
1206DP02
1206MW04
No Data - Insufficient water for sampling
1206MW06
No Data - Insufficient water for sampling
1206MW06
1206DP27 (7/19/2007)
Benzene 0.35J
Benzo[a]anthracene NA
Benzo[b]fluoranthene NA
Benzo[a]pyrene NA
Indeno(1,2,3-cd)pyrene NA
Vinyl chloride ND (1)
1,2-Dichloroethane 2.2
1206DP27
1206MW02
No Organic COPCs detected in 2006
1206MW02
1206DP05
1206DP03
1206DP15
1206DP04
1206DP07
1206DP10
1206MW08
1206DP09
1206DP11
1206MW09
1206DP08
LF6MW8
1206DP01A
1206DP01
1206DP14
1206MW07
1206DP12
1206DP19
1206DP13
1206DPW24
1206MW03
No Organic COPCs detected in 2006
1206MW03
1206DP26
1206DP26
No Organic COPCs detected in 2007
1206DP24
No Data - well dry
EVANS STREET
1206DP18
Concrete slab w/ Sump
1206DP20
1206DP20
No Data - well dry
1206DP22
1206DP06
1206MW01
1206MW01
No Organic COPCs detected in 2006
1206DP22 [7/19/2007]
Benzene 0.58J
Benzo[a]anthracene NA
Benzo[b]fluoranthene NA
Benzo[a]pyrene NA
Indeno(1,2,3-cd)pyrene NA
Vinyl chloride ND (1)
1,2-Dichloroethane 16
1206DP21
No Data - Insufficient water for sampling
1206DP21
CHILES AVENUE
1206DP25
1206DP25
No Organic COPCs detected in 2007
1206DP23
No Data - well dry
1206MW08 (08/20/2004)
1,2-Dichloroethane ND (1)
1,2-Dichloropropane 1J
Benzene 1J [H]
Benzo[a]anthracene 1J [M,I]
Benzo[b]fluoranthene ND (6) (UJ) [M]
Benzo[a]pyrene ND (6) (UJ) [M]
bis(2-Ethylhexyl)phthalate 6J (J) [CC,I]
Chrysene 1J (J) [M,I]
Indeno(1,2,3-cd)pyrene ND (5) (UJ) [CC,I]
Vinyl chloride ND (1)
1206MW08 (4/6/2006)
1,2-Dichloroethane 2.23
1,2-Dichloropropane NA
Benzene 3.78
Benzo[a]anthracene 8.52 (J) [Q]
Benzo[b]fluoranthene 6.28 (J) [Q]
Benzo[a]pyrene 4.56 (J) [Q]
bis(2-Ethylhexyl)phthalate NA
Chrysene NA
Indeno(1,2,3-cd)pyrene 1.71
Vinyl chloride ND (1)
1206MW08 (7/17/2007)
1,2-Dichloroethane 2.2
1,2-Dichloropropane NA
Benzene NA
Benzo[a]anthracene NA
Benzo[b]fluoranthene NA
Benzo[a]pyrene NA
bis(2-Ethylhexyl)phthalate NA
Chrysene NA
Indeno(1,2,3-cd)pyrene NA
Vinyl chloride ND (1)
1206DP16 (9/14/2007)
Benzene ND (1)
Benzo[a]anthracene ND (0.1)
Benzo[b]fluoranthene ND (0.1)
Benzo[a]pyrene ND (0.1)
Indeno(1,2,3-cd)pyrene ND (0.1)
Vinyl chloride ND (1)
1,2-Dichloroethane 6.8 (J) [M]
1206MW07 (8/20/2004)
1,2-Dichloroethane ND (1)
1,2-Dichloropropane ND (1)
Benzene 5
Benzo[a]anthracene 2J (J) [M,I]
Benzo[b]fluoranthene ND (5) (UJ) [M]
Benzo[a]pyrene ND (5) (UJ) [M]
bis(2-Ethylhexyl)phthalate 3J (J) [CC,I]
Chrysene 1J (J) [M,I]
Indeno(1,2,3-cd)pyrene ND (5) (UJ) [CC,I]
Vinyl chloride 69
1206MW07 (4/26/2006)
1,2-Dichloroethane 0.294J
1,2-Dichloropropane NA
Benzene 6.76
Benzo[a]anthracene 1.63
Benzo[b]fluoranthene 0.745
Benzo[a]pyrene 0.589
bis(2-Ethylhexyl)phthalate NA
Chrysene NA
Indeno(1,2,3-cd)pyrene 0.168J
Vinyl chloride 26.4
1206MW07 (7/17/2007)
1,2-Dichloroethane ND (1)
1,2-Dichloropropane NA
Benzene NA
Benzo[a]anthracene NA
Benzo[b]fluoranthene NA
Benzo[a]pyrene NA
bis(2-Ethylhexyl)phthalate NA
Chrysene NA
Indeno(1,2,3-cd)pyrene NA
Vinyl chloride 47
1206DP17
No Organic COPCs detected in 2007
1206DP18 (4/6/2006)
Benzene ND (1.5)
Benzo[a]anthracene ND (0.27)
Benzo[b]fluoranthene ND (0.27)
Benzo[a]pyrene ND (0.27)
Indeno(1,2,3-cd)pyrene ND (0.27)
Vinyl chloride ND (1)
1,2-Dichloroethane 261
1206DP18 (7/17/2007)
Benzene NA
Benzo[a]anthracene NA
Benzo[b]fluoranthene NA
Benzo[a]pyrene NA
Indeno(1,2,3-cd)pyrene NA
Vinyl chloride NA
1,2-Dichloroethane 270
LF6MW8 (8/18/2004)
Benzene 1J (J) [H]
Benzo[a]anthracene 2J (J) [S,M,I]
Benzo[b]fluoranthene 2J (J) [S,M]
Benzo[a]pyrene 1J (J) [S,M]
bis(2-Ethylhexyl)phthalate 2J (J) [S,I]
Chrysene 2J (J) [S,M,I]
Indeno(1,2,3-cd)pyrene ND (5) (UJ) [S,I]
Vinyl chloride ND (1)
1,2-Dichloroethane ND (1)
1,2-Dichloropropane ND (1)
LF6MW8 (4/8/2006)
Benzene 0.144
Benzo[a]anthracene 2.85J
Benzo[b]fluoranthene 2.52J
Benzo[a]pyrene 2.95J
bis(2-Ethylhexyl)phthalate NA
Chrysene NA
Indeno(1,2,3-cd)pyrene ND (4.12)
Vinyl chloride ND (1)
1,2-Dichloroethane ND (1)
1,2-Dichloropropane NA
LF6MW8 (7/19/2007)
Benzene NA
Benzo[a]anthracene NA
Benzo[b]fluoranthene NA
Benzo[a]pyrene NA
bis(2-Ethylhexyl)phthalate NA
Chrysene NA
Indeno(1,2,3-cd)pyrene NA
Vinyl chloride ND (1)
1,2-Dichloroethane ND (1)
1,2-Dichloropropane NA
Plume Delineation Lines
1,2-Dichloroethane (1 ug/L)
bis(2-ethylhexyl)phthalate (6 ug/L)
Benzene (5 ug/L)
Total PAHs (1 ug/L)
Vinyl Chloride (2 ug/L)
LEGEND
Former Buildings
Former Dispensers
Direct Push
Monitoring Well
Former Curbs
Former Subsurface Piping and Tanks
NOTES:
AVIII - 6CCR, 1007-3, 261, Appendix VIII list.
AIX - 6CCR, 1003-3, 264, Appendix IX list.
CGWS Colorado Ground Water Standards (P=primary).
All groundwater results in ug/L.
ug/L - micrograms per liter.
Shaded values equal or exceed cleanup goal.
J - Result is an estimate because quality control criteria were not met.
UJ - The analyte was not detected above the reported method detect limit; however, the reported method detection limit is appropriate and may or may not represent the actual limit of detection.
CC - Continuing calibration for target analyte outside of method specified control limits.
H - Holding time criteria exceeded.
I - For Organics: Internal standard area count recoveries outside quantitation limits
M - Matrix spike/Matrix spike duplicate recoveries or relative percent difference for target analyte outside control limits.
Q - Qualified based on reviewer's professional judgement.
S- Recovery of surrogate associated with target analyte outside of control limits.
PAHs - Polynuclear Aromatic Hydrocarbons.
Stratmoor
Colorado Springs
Fort Carson
SWMU 169
N
0 15 30 60 Feet
PROJECTION :CO STATE PLANE CENTRAL, NAD 83
SCALE 1 : 360 ONE INCH = 30 FEET
U.S. ARMY ENVIRONMENTAL COMMAND
FT. CARSON PERFORMANCE BASED ACQUISITION
FIGURE NUMBER 2-3
COCS IN GROUNDWATER
SWMU 169
FORT CARSON MILITARY INSTALLATION
Shaw Shaw Environmental, Inc.
Generated By: JRL Date: 05/14/09 File Path:F:\GISDATA2\FtCarson\GIS_Documents\Project Maps\SWMU169\FtCarson_Fig2_3_Organic_GW_CoCs.mxd
Project Number: 132626


1206MW12
1206DPT12
1206DP27
1 ug/L
1206DPT01
1 ug/L
1206MW08
1206DPT11
1206DPT04
1206DP16
1206MW09
5 ug/L
1206DPT02
1206DPT03
1206DPT10
5 ug/L
1206MW07
1206DPT09
LF6MW8
0 ug/L
1206DPT08
2 ug/L
1206MW03
1206MW03
EVANS STREET
5 ug/L
1206MW10
1206DPT05
1206MW10
1206DPT07
CHILES AVENUE
1206DPT06
1206DP22
1206MW11
1206MW01
1211
1206
LEGEND
Former Buildings
Former Dispensers
Direct Push
Existing Monitoring Well
Proposed Injection Well
Proposed Monitoring Well
Former Curbs
Former Subsurface Piping and Tanks
Plume Delineation Lines
1,2-Dichloroethane
bis(2-ethylhexyl)phthalate
Benzene
Total PAHs
Vinyl Chloride
NOTES:
ug/L - micrograms per liter.
PAHs = Polynuclear Aromatic Hydrocarbons.
Stratmoor
Colorado Springs
Fort Carson
SWMU 169
N
0
15
30
60
Feet
PROJECTION :CO STATE PLANE CENTRAL, NAD 83
SCALE 1:360 ONE INCH = 30 FEET
U.S. ARMY ENVIRONMENTAL COMMAND
FT. CARSON PERFORMANCE BASED ACQUISITION
FIGURE NUMBER 6-1
PROPOSED INJECTION POINTS AND MONITORING WELL LOCATIONS
SWMU 169
FORT CARSON MILITARY INSTALLATION
Shaw Environmental, Inc.
Generated By: JRL Date: 05/14/09 File Path:F:\GIS\DATA2\FtCarson\GIS_Documents\Project_Maps\SWMU169\FtCarson_033_Fig6_1_swmu169_propInj_MWsPlumes.mxd
Project Number: 132626

Project Number: 132626 Generated By: JRL Date: 05/14/09 File Path:F:\GISDATA2\FtCarson\GIS_Documents\Project_Maps\SWMU169\FtCarson_033_Fig6_1_swmu169_proplnj_MWsPlumes.mxd

1206MW12
1206DPT12
1206DP27
1 ug/L
1206DPT01
1 ug/L
1206MW08
1206DPT11
1206DPT04
1206DP16
1206MW09
1211
1206DPT03
LF6MW8
1206DPT10
5 ug/L
1206MW07
1206DPT02
5 ug/L
1206DPT09
1206
6 ug/L
1206DPT08
2 ug/L
1206MW03
1206MW03
EVANS STREET
5 ug/L
1206MW10
1206DPT05
1206MW10
1206DPT07
1206DPT06
1206DP22
1206MW11
1206MW01
CHILES AVENUE

SWMU 169-Original

LEGEND

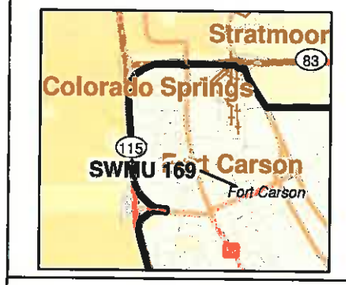
- Former Buildings
- Former Dispensers
- Direct Push
- Existing Monitoring Well
- Proposed Injection Well
- Proposed Monitoring Well
- Former Curbs
- Former Subsurface Piping and Tanks

Plume Delineation Lines

- 1,2-Dichloroethane
- bis(2-ethylhexyl)phthalate
- Benzene
- Total PAHs
- Vinyl Chloride

NOTES:

ug/L - micrograms per liter.
PAHs = Polynuclear Aromatic Hydrocarbons.



N 0 15 30 60 Feet

PROJECTION :CO STATE PLANE CENTRAL, NAD 83
SCALE 1 : 360 ONE INCH = 30 FEET

U.S. ARMY ENVIRONMENTAL COMMAND

FT. CARSON PERFORMANCE BASED ACQUISITION

FIGURE NUMBER	PROPOSED INJECTION POINTS AND MONITORING WELL LOCATIONS SWMU 169 FORT CARSON MILITARY INSTALLATION
6-1	

Shaw Shaw Environmental, Inc.

1206MW12

1206MW08

1211

LF6MW8

Groundwater Flow Direction

1206MW07

LEGEND

- Proposed Injection Well
- Compliance Monitoring Well
- Former Curbs
- Former Subsurface Piping and Tanks
- Former Buildings
- Former Dispensers

SWMU 169

N 0 5 10 20 Feet

PROJECTION: NAD 83, UTM Zone 13N

U.S. ARMY ENVIRONMENTAL COMMAND

FT. CARSON PERFORMANCE BASED ACQUISITION

FIGURE NUMBER	PROPOSED INJECTION WELL MAP SWMU 169 FORT CARSON MILITARY INSTALLATION
2	

Shaw a world of Solutions

Project Number: 132626 Generated By:MAO Date: 04/17/12 File Path:\\Crpbtrpgi01\arcgisprod2\FtCarson\GIS Documents\Project Maps\SWMU169\FtCarson 077 Fig2 swmu169 Proposed Injection Wells.mxd

B
SOUTHWEST

B'
NORTHEAST

1206MW02
5864.21

LF6MW8
5863.10

1206MW07
5862.04

1206DP11
5861.97

1206DP16
5861.51

1206MW06
5861.77

5865
5860
5855
5850
5845
5840

FILL
FILL
FILL
FILL
FILL
ALLUVIUM
ALLUVIUM
TANK FILL
WEATHERED PIERRE SHALE
WEATHERED PIERRE SHALE
WEATHERED PIERRE SHALE
WEATHERED PIERRE SHALE

TD=15'
TD=14'
TD=15'
TD=15'
TD=14'
TD=10'

LEGEND

1206MW02 LOCATION IDENTIFIER

5864.21 SURFACE ELEVATION (FEET)

ESTIMATED INTERVAL OF PETROLEUM-STAINED SOIL ENCOUNTERED DURING DRILLING

BOREHOLE

WELL SCREEN INTERVAL

TD TOTAL DEPTH (FEET BELOW GROUND SURFACE)

DEPTH TO GROUNDWATER MEASURED ON JULY 17, 2007

----- FILL/ALLUVIUM CONTACT

— — — FILL-ALLUVIUM/PIERRE SHALE CONTACT

APPROX FORMER TANK PIT LOCATION

0
2
4
20 10 0
SCALE IN FEET

SWMU 169

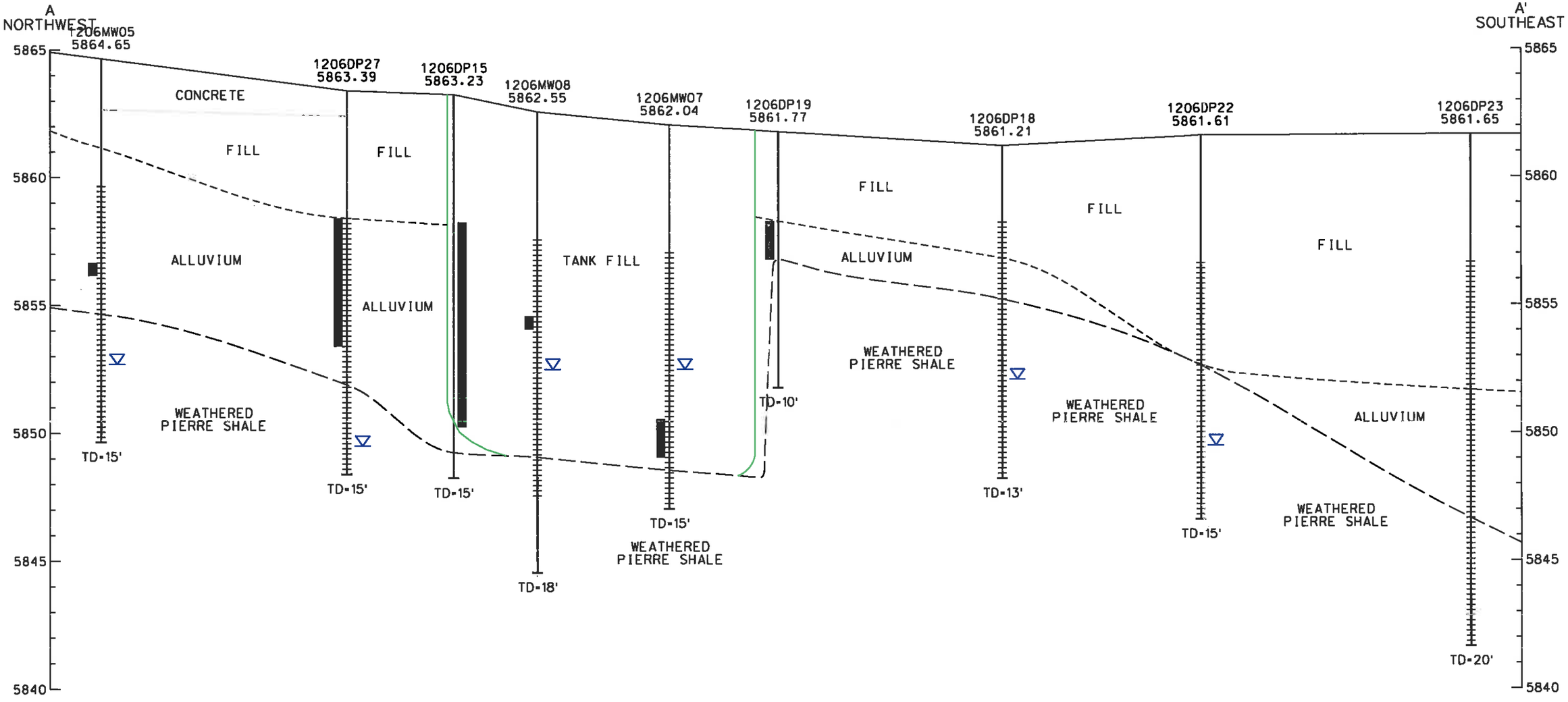
FIGURE 5-2

GEOLOGIC CROSS SECTION B-B'

SWMU 169, FORMER BUILDING 1211
FORT CARSON, COLORADO

EARTH TECH

CAD FILE: L:\WORK\29188\CAD\FTCARSON\GRDJCT\MICROSTA\SWMU169\RFI07\XSECT_B.DGN DATE: 12-28-2007



CAD FILE: L:\WORK\29188\CAD\FTCARSON\GRDJCT\MICROSTA\SWMU169\RFI07\XSECT_A.DGN DATE: 12-28-2007

LEGEND

1206MW05 LOCATION IDENTIFIER

5864.65 SURFACE ELEVATION (FEET)

ESTIMATED INTERVAL OF PETROLEUM-STAINED SOIL ENCOUNTERED DURING DRILLING

BOREHOLE

WELL SCREEN INTERVAL

TD TOTAL DEPTH (FEET BELOW GROUND SURFACE)

DEPTH TO GROUNDWATER MEASURED ON JULY 17, 2007

----- FILL/ALLUVIUM CONTACT

— — — FILL-ALLUVIUM/PIERRE SHALE CONTACT

APPROX FORMER TANK PIT LOCATION

0 2 4

20 10 0

SCALE IN FEET

SWMU 169

EARTH TECH

FIGURE 5-1

GEOLOGIC CROSS SECTION A-A'

SWMU 169, FORMER BUILDING 1211
FORT CARSON, COLORADO

Table 1
Analytes Detected in Groundwater
January 2010 through September 2011
SWMU 169
Fort Carson, Colorado

							Location Code		1206MW11		1206MW11		1206MW11		1206MW11		1206MW11		1206MW11		1206MW11		1206MW11	
							Sample No.		1206MW11-100112		1206MW11-100308		1206MW11-100622		1206MW11-100922		1206MW11-101221		1206MW11-110316		1206MW11-110623		1206MW11-110921	
							Sample Date		12-Jan-10		8-Mar-10		22-Jun-10		22-Sep-10		21-Dec-10		16-Mar-11		23-Jun-11		21-Sep-11	
				CGWS	CGWS	Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG	
Test Group	METHOD	Parameter	Units	(AG)	(P)	RBC	PAL	BG	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
FIELD TESTS	D1498	OXIDATION-REDUCTION POTENTIAL	mV						151.8		187.5		164.1		198.9		-156.4		-35.1		263			
FIELD TESTS	E120.1	SPECIFIC CONDUCTIVITY	mS/cm						7.343		51.83		21.66		19.2		16.24		15.17		15.43			
FIELD TESTS	E150.1	PH	PH UNITS						7.13		11.02		7.95		7.56		7.67		7.31		5.27			
FIELD TESTS	E170.1	TEMPERATURE	C						13.22		10.87		13.61		17.89		16.48		11.84		13.9			
FIELD TESTS	E180.1	TURBIDITY	NTU						24.5		94.6		244		41		21.9		33.5		163			
FIELD TESTS	E360.1	DISSOLVED OXYGEN	mg/L						6.23		2.05		3.66		2.58		2.55		5.17		6.58			
SEMIVOLAT(SIM)	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1										ND	U						
SEMIVOLAT(SIM)	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2										ND	U						
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHENE	ug/L		420	52	420										ND	U						
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHYLENE	ug/L														ND	U						
SEMIVOLAT(SIM)	BNASIM	ANTHRACENE	ug/L		2100	34	2100										ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048										ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048										ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048										ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(GHI)PERYLENE	ug/L														ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048										ND	U						
SEMIVOLAT(SIM)	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048										ND	U						
SEMIVOLAT(SIM)	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048										ND	U						
SEMIVOLAT(SIM)	BNASIM	FLUORANTHENE	ug/L		280	21	280										ND	U						
SEMIVOLAT(SIM)	BNASIM	FLUORENE	ug/L		280	41	280										ND	U						
SEMIVOLAT(SIM)	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048										ND	U						
SEMIVOLAT(SIM)	BNASIM	NAPHTHALENE	ug/L		140	71	140										ND	U						
SEMIVOLAT(SIM)	BNASIM	PHENANTHRENE	ug/L														ND	U						
SEMIVOLAT(SIM)	BNASIM	PYRENE	ug/L		210	23	210										ND	U						
SEMIVOLATILES	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1																ND	U
SEMIVOLATILES	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2																ND	U
SEMIVOLATILES	BNASIM	ACENAPHTHENE	ug/L		420	52	420																ND	U
SEMIVOLATILES	BNASIM	ACENAPHTHYLENE	ug/L																				ND	U
SEMIVOLATILES	BNASIM	ANTHRACENE	ug/L		2100	34	2100																ND	U
SEMIVOLATILES	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048																ND	U
SEMIVOLATILES	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048																ND	U
SEMIVOLATILES	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048																ND	U
SEMIVOLATILES	BNASIM	BENZO(GHI)PERYLENE	ug/L																				ND	U
SEMIVOLATILES	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048																ND	U
SEMIVOLATILES	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048																ND	U
SEMIVOLATILES	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048																ND	U
SEMIVOLATILES	BNASIM	FLUORANTHENE	ug/L		280	21	280																ND	U
SEMIVOLATILES	BNASIM	FLUORENE	ug/L		280	41	280																ND	U
SEMIVOLATILES	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048																ND	U
SEMIVOLATILES	BNASIM	NAPHTHALENE	ug/L		140	71	140																ND	U
SEMIVOLATILES	BNASIM	PHENANTHRENE	ug/L																				ND	U
SEMIVOLATILES	BNASIM	PYRENE	ug/L		210	23	210																ND	U
SEMIVOLATILES	SW8270C	1-METHYL NAPHTHALENE	ug/L			2.1	2.1				ND	U	ND	U	0.0331	J								
SEMIVOLATILES	SW8270C	2-METHYLNAPHTHALENE	ug/L			25.2	25.2				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	ACENAPHTHENE	ug/L		420	52	420				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	ACENAPHTHYLENE	ug/L								ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	ANTHRACENE	ug/L		2100	34	2100				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(GHI)PERYLENE	ug/L								ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	CHRYSENE	ug/L		0.0048	2.95	0.0048				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	FLUORANTHENE	ug/L		280	21	280				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	FLUORENE	ug/L		280	41	280				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048				ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	NAPHTHALENE	ug/L		140	71	140				0.0374	J	ND	U	ND	U								
SEMIVOLATILES	SW8270C	PHENANTHRENE	ug/L								ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	PYRENE	ug/L		210	23	210				ND	U	ND	U	ND	U								
VOLATILES	SW8260B	1,2-DIBROMOETHANE	ug/L						ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROETHANE	ug/L		0.38	0.636	0.38		22.8		11		19.9		28.9		26.2		17.7		15.5		14.5	
VOLATILES	SW8260B	1,2-DICHLOROPROPANE	ug/L		0.52	1.682	0.52		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	4-METHYL-2-PENTANONE (MIBK)	ug/L			959	959		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ACETONE	ug/L			10786	10786		ND	U	193		62.1		39		ND	U	3.18	J	2.61	J	3.29	J
VOLATILES	SW8260B	ANTHRACENE	ug/L		2100	34	2100																	
VOLATILES	SW8260B	BENZENE	ug/L		5	1.05	5		ND	U	0.432	J	0.368	J	0.256	J	0.198	J	ND	U	ND	U	ND	U
VOLATILES	SW8260B	BROMOMETHANE	ug/L			16.2	16		ND	U	6.41		2.28		ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CARBON DISULFIDE	ug/L			226	226		ND	U	ND	U	0.701	J	1.23	J	1.12	J	0.681	J	ND	U	ND	U
VOLATILES	SW8260B	CHLOROFORM	ug/L		3.5	16	3.5		0.333	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROMETHANE	ug/L			4.6	4.6		ND	U	1.06		ND	U	ND	U	0.514	J	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CIS-1,2-DICHLOROETHENE	ug/L		70	24	70		ND	U	ND	U	0.306	J	0.325	J	0.3	J	0.367	J	0.306	J	0.346	J
VOLATILES	SW8260B	ETHYL BENZENE	ug/L		700	89	700		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	IODOMETHANE	ug/L						ND	U	ND	Q	2.48		ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYL ETHYL KETONE	ug/L			7098	7098		ND	U	18.9		6.91	J	4.94	J	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYLENE CHLORIDE	ug/L		4.7	7.99	4.7		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	NAPHTHALENE	ug/L		140	71	140		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TETRACHLOROETHYLENE	ug/L		5	0.106	5		0.737	J	0.768	J	0.889	J	1.63		1.14		0.909	J	0.975	J	0.872	J
VOLATILES	SW8260B	TOLUENE	ug/L		560	132	560		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRANS-1,2-DICHLOROETHENE	ug/L		100	230	100		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRICHLOROETHENE	ug/L		5	0.142	5		1.25		0.519	J	1.44		1.77		1.46		1.57		1.59		1.72	
VOLATILES	SW8260B	VINYL CHLORIDE	ug/L		0.023	0.016	0.023		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	XYLENES, TOTAL	ug/L		10000	79	10000		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Table 1
Analytes Detected in Groundwater
January 2010 through September 2011
SWMU 169
Fort Carson, Colorado

						Location Code	1206MW13		1206MW13		1206MW13		1206MW13		1206MW13		1206MW13		1206MW13		LF6MW08		LF6MW08		LF6MW08		LF6MW08		LF6MW08	
						Sample No.	1206MW13-100112		1206MW13-100308		1206MW13-100522		1206MW13-100922		1206MW13-101221		1206MW13-110317		1206MW13-110623		1206MW13-110921		LF6MW08-100308		DUP-01-100308		LF6MW08-100622		LF6MW08-100922		LF6MW08-101222	
						Sample Date	12-Jan-10		8-Mar-10		22-Jun-10		22-Sep-10		21-Dec-10		17-Mar-11		23-Jun-11		21-Sep-11		8-Mar-10		8-Mar-10		22-Jun-10		22-Sep-10		22-Dec-10	
				CGWS	CGWS	Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG	
Test Group	METHOD	Parameter	Units	(AC)	(P)	RBC	PAL	BG	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
FIELD TESTS	D1498	OXIDATION-REDUCTION POTENTIAL	mV						109.8		52.5		76.1		-15.8		-148.8		-42.1		11.4		84.1				-36.5		16.9		-93.4	
FIELD TESTS	E120.1	SPECIFIC CONDUCTIVITY	mS/cm						4.984		10.03		5.195		5.66		5.122		4.923		5.152		62.09				11.76		7.4		14.84	
FIELD TESTS	E150.1	PH	PH UNITS						8.81		6.86		7.02		6.68		6.95		8.59		10.4		13.93				11.48		11.93		11.96	
FIELD TESTS	E170.1	TEMPERATURE	C						13.77		11.29		13.5		17.67		16.01		12.57		13.1		10.74				14.16		18.36		15.52	
FIELD TESTS	E180.1	TURBIDITY	NTU						116		13.1		2.5		10		3.8		13		55		151.6				522		242		37.4	
FIELD TESTS	E360.1	DISSOLVED OXYGEN	mg/L						4.66		2.87		3.6		4.27		3.48		8.23		4.64		2.33				1.4		1.83		3.93	
SEMIVOLAT(SIM)	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1										ND	U	ND	U	0.0542											
SEMIVOLAT(SIM)	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2										ND	U	ND	U	NC	U										
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHENE	ug/L		420	52	420										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHYLENE	ug/L														ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	ANTHRACENE	ug/L		2100	34	2100										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	BENZO(GHI)PERYLENE	ug/L														ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	FLUORANTHENE	ug/L		280	21	280										ND	U	ND	U	0.0388	J										
SEMIVOLAT(SIM)	BNASIM	FLUORENE	ug/L		280	41	280										ND	U	ND	U	0.032	J										
SEMIVOLAT(SIM)	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	NAPHTHALENE	ug/L		140	71	140										ND	U	ND	U	ND	U										
SEMIVOLAT(SIM)	BNASIM	PHENANTHRENE	ug/L														ND	U	ND	U	0.0956											
SEMIVOLAT(SIM)	BNASIM	PYRENE	ug/L		210	23	210										ND	U	ND	U	ND	U										
SEMIVOLATILES	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1																ND	U								
SEMIVOLATILES	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2																ND	U								
SEMIVOLATILES	BNASIM	ACENAPHTHENE	ug/L		420	52	420																ND	U								
SEMIVOLATILES	BNASIM	ACENAPHTHYLENE	ug/L																				ND	U								
SEMIVOLATILES	BNASIM	ANTHRACENE	ug/L		2100	34	2100																ND	U								
SEMIVOLATILES	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048																ND	U								
SEMIVOLATILES	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048																ND	U								
SEMIVOLATILES	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048																ND	U								
SEMIVOLATILES	BNASIM	BENZO(GHI)PERYLENE	ug/L																				ND	U								
SEMIVOLATILES	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048																ND	U								
SEMIVOLATILES	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048																ND	U								
SEMIVOLATILES	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048																ND	U								
SEMIVOLATILES	BNASIM	FLUORANTHENE	ug/L		280	21	280																ND	U								
SEMIVOLATILES	BNASIM	FLUORENE	ug/L		280	41	280																ND	U								
SEMIVOLATILES	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048																ND	U								
SEMIVOLATILES	BNASIM	NAPHTHALENE	ug/L		140	71	140																ND	U								
SEMIVOLATILES	BNASIM	PHENANTHRENE	ug/L																				ND	U								
SEMIVOLATILES	BNASIM	PYRENE	ug/L		210	23	210																ND	U								
SEMIVOLATILES	SW8270C	1-METHYL NAPHTHALENE	ug/L			2.1	2.1		ND	U	ND	U	0.0885										61.2		65.8		25.4		21.9			
SEMIVOLATILES	SW8270C	2-METHYLNAPHTHALENE	ug/L			25.2	25.2		0.0927		0.0403	J	0.131										73.5		79.7		31.8		28.1			
SEMIVOLATILES	SW8270C	ACENAPHTHENE	ug/L		420	52	420		ND	U	ND	U	NC	U									ND	U	ND	U	ND	U	ND	U		
SEMIVOLATILES	SW8270C	ACENAPHTHYLENE	ug/L						ND	U	ND	U	ND	U									ND	U	ND	U	ND	U	ND	U		
SEMIVOLATILES	SW8270C	ANTHRACENE	ug/L		2100	34	2100		ND	U	ND	U	ND	U									0.789		0.594		0.159		0.103			
SEMIVOLATILES	SW8270C	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048		ND	U	ND	U	ND	U									0.48		0.321		0.0888		0.0755			
SEMIVOLATILES	SW8270C	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048		ND	U	ND	U	ND	U									0.456		0.435		0.0886		0.0648			
SEMIVOLATILES	SW8270C	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048		ND	U	ND	U	ND	U									0.784		0.733		0.132		ND	U		
SEMIVOLATILES	SW8270C	BENZO(GHI)PERYLENE	ug/L						ND	U	ND	U	ND	U									0.423		0.44		0.0885		0.0444	J		
SEMIVOLATILES	SW8270C	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048		ND	U	ND	U	ND	U									0.586		0.563		0.1		ND	U		
SEMIVOLATILES	SW8270C	CHRYSENE	ug/L		0.0048	2.95	0.0048		ND	U	ND	U	ND	U									0.667		0.54		0.134		0.0769			
SEMIVOLATILES	SW8270C	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048		ND	U	ND	U	ND	U									0.197		0.138		0.0335	J	ND	U		
SEMIVOLATILES	SW8270C	FLUORANTHENE	ug/L		280	21	280		ND	U	ND	U	ND	U									1.28		0.725		0.213		0.177			
SEMIVOLATILES	SW8270C	FLUORENE	ug/L		280	41	280		ND	U	ND	U	ND	U									ND	U	ND	U	1.84		1.32			
SEMIVOLATILES	SW8270C	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048		ND	U	ND	U	ND	U									0.332		0.333		0.0634		0.032	J		
SEMIVOLATILES	SW8270C	NAPHTHALENE	ug/L		140	71	140		ND	U	ND	U	ND	U									53.2		50.8		25.3		21.6			
SEMIVOLATILES	SW8270C	PHENANTHRENE	ug/L						ND	U	ND	U	ND	U									3.94		4.69		1.86		1.43			
SEMIVOLATILES	SW8270C	PYRENE	ug/L		210	23	210		ND	U	ND	U	ND	U									2.47		2		0.519		0.315			
VOLATILES	SW8260B	1,2-DIBROMOETHANE	ug/L					ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROETHANE	ug/L		0.38	0.636	0.38	1.08		1.29		1.86		1.61		1.5		1.55		1.31		1.14	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROPROPANE	ug/L		0.52	1.582	0.52	ND	U	ND	U	ND	U	0.204	J	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	4-METHYL-2-PENTANONE (MIBK)	ug/L			959	959	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	2.53	J	ND	U
VOLATILES	SW8260B	ACETONE	ug/L			10786	10786	2.54	J	5.07	J	12.8		6.41	J	ND	U	ND	U	ND	U	2.97	J	381		386		280		293		283	
VOLATILES	SW8260B	ANTHRACENE	ug/L		2100	34	2100																									
VOLATILES	SW8260B	BENZENE	ug/L		5	7.05	5	ND	U	0.159	J	0.199	J	0.592	J	0.545	J	ND	U	ND	U	ND	U	2.04		1.82		1.52	J	1.6		1	
VOLATILES	SW8260B	BROMOMETHANE	ug/L			16.2	16	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CARBON DISULFIDE	ug/L			226	226	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROFORM	ug/L		3.5	16	3.5		0.137	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROMETHANE	ug/L			4.6	4.6	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	CIS-1,2-DICHLOROETHENE	ug/L		70	24	73	ND	U	14.8		15.7		61.7		41.9		8.73		6.57		11.8	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ETHYL BENZENE	ug/L		700	89	700	ND	U	ND	U	ND	U	0.575	J	ND	U	ND	U	ND	U	ND	U	4.74		4.1		2.4		1.56		1.07	
VOLATILES	SW8260B	IODOMETHANE	ug/L					ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYL ETHYL KETONE	ug/L			7098	7098	ND	U	3.74	J	ND	U	33.2		ND	U	ND	U	ND	U	ND	U	57.9		58.5		43.3		46.1		65.6	
VOLATILES	SW8260B	METHYLENE CHLORIDE	ug/L		4.7	7.99	4.7	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	0.267	J	ND	U	ND	U	ND	U
VOLATILES	SW8260B	NAPHTHALENE	ug/L		140	71	140	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	53.8		56.6		27.5		14.9		13.2	
VOLATILES	SW8260B	TETRACHLOROETHYLENE	ug/L		5	0.106	5	ND	U	1.57		1.34		2.19		1.15		0.468	J	0.406	J	0.881	J	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TOLUENE	ug/L		560	132	560	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	0.519	J	0.527	J	0.849	J	ND	U	ND	U
VOLATILES	SW8260B	TRANS-1,2-DICHLOROETHENE	ug/L		100	230	100	ND	U	0.726	J	0.5	J	0.994	J	0.832	J	ND	U	NC	U	0.488	J	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRICHLOROETHENE	ug/L		5	0.742	5	ND	U	4.02		3.73		7.1		6.12		1.86		1.56		2.52	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	VINYL CHLORIDE	ug/L		0.023	0.016	0.023	ND	U	ND	U	ND	U	0.258	J	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	XYLENES, TOTAL	ug/L		10000	79	10000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	6.25		5.34		3.27		1.86		1.33	J

Table 1
Analytes Detected in Groundwater
January 2010 through September 2011
SWMU 168
Fort Carson, Colorado

						Location Code			1206MW12		1206MW12		1206MW12		1206MW12		1206MW12		1206MW12	
						Sample No.			1206MW12-100112		1206MW12-100309		1206MW12-100622		1206MW12-100922		1206MW12-101222		1206MW12-110921	
						Sample Date			12-Jan-10		9-Mar-10		22-Jun-10		22-Sep-10		22-Dec-10		21-Sep-11	
				CGWS	CGWS	Sample Purpose			REG		REG		REG		REG		REG		REG	
Test Group	METHOD	Parameter	Units	(AG)	(P)	RBC	PAL	BG	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
FIELD TESTS	31498	OXIDATION-REDUCTION POTENTIAL	mV						-5.1		33		15.4		-49.1		-120.1			
FIELD TESTS	E120.1	SPECIFIC CONDUCTIVITY	mS/cm						3.34		12.71		6.71		7.19		6.617			
FIELD TESTS	E150.1	PH	PH UNITS						6.73		7.12		6.67		6.72		7.33			
FIELD TESTS	E170.1	TEMPERATURE	C						14.3		11.65		14.94		18.26		16.24			
FIELD TESTS	E180.1	TURBIDITY	NTU						19.7		40.1		20.3		45		47.1			
FIELD TESTS	E350.1	DISSOLVED OXYGEN	mg/L						5.1		2.1		1.99		2.65		3.64			
SEMIVOLAT(SIM)	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1													
SEMIVOLAT(SIM)	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2													
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHENE	ug/L		420	52	420													
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHYLENE	ug/L																	
SEMIVOLAT(SIM)	BNASIM	ANTHRACENE	ug/L		2100	34	2100													
SEMIVOLAT(SIM)	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048													
SEMIVOLAT(SIM)	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048													
SEMIVOLAT(SIM)	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048													
SEMIVOLAT(SIM)	BNASIM	BENZO(GHI)PERYLENE	ug/L																	
SEMIVOLAT(SIM)	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048													
SEMIVOLAT(SIM)	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048													
SEMIVOLAT(SIM)	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048													
SEMIVOLAT(SIM)	BNASIM	FLUORANTHENE	ug/L		280	21	280													
SEMIVOLAT(SIM)	BNASIM	FLUORENE	ug/L		280	41	280													
SEMIVOLAT(SIM)	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048													
SEMIVOLAT(SIM)	BNASIM	NAPHTHALENE	ug/L		140	71	140													
SEMIVOLAT(SIM)	BNASIM	PHENANTHRENE	ug/L																	
SEMIVOLAT(SIM)	BNASIM	PYRENE	ug/L		210	23	210													
SEMIVOLATILES	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1													
SEMIVOLATILES	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2													
SEMIVOLATILES	BNASIM	ACENAPHTHENE	ug/L		420	52	420													
SEMIVOLATILES	BNASIM	ACENAPHTHYLENE	ug/L																	
SEMIVOLATILES	BNASIM	ANTHRACENE	ug/L		2100	34	2100													
SEMIVOLATILES	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048													
SEMIVOLATILES	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048													
SEMIVOLATILES	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048													
SEMIVOLATILES	BNASIM	BENZO(GHI)PERYLENE	ug/L																	
SEMIVOLATILES	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048													
SEMIVOLATILES	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048													
SEMIVOLATILES	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048													
SEMIVOLATILES	BNASIM	FLUORANTHENE	ug/L		280	21	280													
SEMIVOLATILES	BNASIM	FLUORENE	ug/L		280	41	280													
SEMIVOLATILES	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048													
SEMIVOLATILES	BNASIM	NAPHTHALENE	ug/L		140	71	140													
SEMIVOLATILES	BNASIM	PHENANTHRENE	ug/L																	
SEMIVOLATILES	BNASIM	PYRENE	ug/L		210	23	210													
SEMIVOLATILES	SW8270C	1-METHYL NAPHTHALENE	ug/L			2.1	2.1								ND	U				
SEMIVOLATILES	SW8270C	2-METHYLNAPHTHALENE	ug/L			25.2	25.2								ND	U				
SEMIVOLATILES	SW8270C	ACENAPHTHENE	ug/L		420	52	420								ND	U				
SEMIVOLATILES	SW8270C	ACENAPHTHYLENE	ug/L												ND	U				
SEMIVOLATILES	SW8270C	ANTHRACENE	ug/L		2100	34	2100								0.865					
SEMIVOLATILES	SW8270C	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048								1.45					
SEMIVOLATILES	SW8270C	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048								0.988					
SEMIVOLATILES	SW8270C	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048								1.12					
SEMIVOLATILES	SW8270C	BENZO(GHI)PERYLENE	ug/L												0.452					
SEMIVOLATILES	SW8270C	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048								1.02					
SEMIVOLATILES	SW8270C	CHRYSENE	ug/L		0.0048	2.95	0.0048								1.27					
SEMIVOLATILES	SW8270C	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048								0.193					
SEMIVOLATILES	SW8270C	FLUORANTHENE	ug/L		280	21	280								2.65					
SEMIVOLATILES	SW8270C	FLUORENE	ug/L		280	41	280								3.43					
SEMIVOLATILES	SW8270C	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048								0.434					
SEMIVOLATILES	SW8270C	NAPHTHALENE	ug/L		140	71	140								ND	U				
SEMIVOLATILES	SW8270C	PHENANTHRENE	ug/L												1.04					
SEMIVOLATILES	SW8270C	PYRENE	ug/L		210	23	210								2.69					
VOLATILES	SW8260B	1,2-DIBROMOETHANE	ug/L						ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROETHANE	ug/L		0.38	0.636	0.38		3.39		3.83		1.22		3.41		2.9		1.51	
VOLATILES	SW8260B	1,2-DICHLOROPROPANE	ug/L		0.52	1.682	0.52		1.36		1.57		1.35		1.47		1.2		0.435	J
VOLATILES	SW8260B	4-METHYL-2-PENTANONE (MIBK)	ug/L			959	959		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ACETONE	ug/L			10788	10788		11.9		22.5		19		40		6.15	J	9.81	J
VOLATILES	SW8260B	ANTHRACENE	ug/L		2100	34	2100													
VOLATILES	SW8260B	BENZENE	ug/L		5	1.05	5		0.382	J	0.406	J	0.297	J	1		0.44	J	ND	U
VOLATILES	SW8260B	BROMOMETHANE	ug/L			16.2	16		ND	U	ND	U	0.684	J	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CARBON DISULFIDE	ug/L			226	226		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROFORM	ug/L		3.5	18	3.5		3.343	J	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROMETHANE	ug/L			4.6	4.6		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CIS-1,2-DICHLOROETHENE	ug/L		70	24	70		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ETHYL BENZENE	ug/L		700	89	700		6.46		13.1		3.62		2.1		0.584	J	ND	U
VOLATILES	SW8260B	IODOMETHANE	ug/L						ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYL ETHYL KETONE	ug/L			7098	7098		ND	U	4.14	J	5.63	J	8.08	J	ND	U	ND	U
VOLATILES	SW8260B	METHYLENE CHLORIDE	ug/L		4.7	7.99	4.7		ND	U	ND	U	ND	U	ND	U	0.306	J	ND	U
VOLATILES	SW8260B	NAPHTHALENE	ug/L		140	71	140		ND	U	2.15		ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TETRACHLOROETHYLENE	ug/L		5	0.108	5		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TOLUENE	ug/L		560	132	560		3.286	J	ND	U	ND	U	ND	U	ND	U	0.527	J
VOLATILES	SW8260B	TRANS-1,2-DICHLOROETHENE	ug/L		100	230	100		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRICHLOROETHENE	ug/L		5	0.142	5		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	VINYL CHLORIDE	ug/L		0.023	0.018	0.023		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	XYLENES, TOTAL	ug/L		10000	79	10000		ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Table 1
Analytes Detected in Groundwater
January 2010 through September 2011
SWMU 169
Fort Carson, Colorado

						Location Code	1206MW01A		1206MW01A		1206MW01A		1206MW01A		1206MW01A		1206MW01A		1206MW01A		1206MW01A		1206MW01A	
						Sample No.	1206MW01A-100111		1206MW01A-100308		1206MW01A-100621		1206MW01A-100922		1206MW01A-101222		1206MW01A-110315		1206MW01A-110622		DUP-01-110622		1206MW01A-110926	
						Sample Date	11-Jan-10		8-Mar-10		21-Jun-10		22-Sep-10		22-Dec-10		15-Mar-11		22-Jun-11		22-Jun-11		20-Sep-11	
				CGWS	CGWS	Sample Purpose	REG		REG		REG		REG		REG		REG		REG		FD		REG	
Test Group	METHOD	Parameter	Units	(AG)	(P)	RBC PAL BG	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
FIELD TESTS	D'498	OXIDATION-REDUCTION POTENTIAL	mV				146.8		271.1		209		160.8		-100		-35.8		273					
FIELD TESTS	E120.1	SPECIFIC CONDUCTIVITY	mS/cm				8.132		16.53		9.442		10.41		9.757		9.053		9.776					
FIELD TESTS	E150.1	PH	PH UNITS				7.23		6.09		7.37		7.26		7.18		7.04		8.22					
FIELD TESTS	E170.1	TEMPERATURE	C				13.71		11.26		12.49		15.52		14.38		12.26		12.61					
FIELD TESTS	E180.1	TURBIDITY	NTU				137.9		24.4		22		24		9.5		22.4		6					
FIELD TESTS	E360.1	DISSOLVED OXYGEN	mg/L				6.88		3.62		4.68		3.28		4.12		9.03		7.85					
SEMIVOLAT(SIM)	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1 2.1									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2 25.2									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHENE	ug/L		420	52 420									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHYLENE	ug/L												ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	ANTHRACENE	ug/L		2100	34 2100									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295 0.0048									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295 0.0048									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295 0.0048									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	BENZO(GHI)PERYLENE	ug/L												ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295 0.0048									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	CHRYSENE	ug/L		0.0048	2.95 0.0048									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295 0.0048									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	FLUORANTHENE	ug/L		280	21 280									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	FLUORENE	ug/L		280	41 280									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295 0.0048									ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	NAPHTHALENE	ug/L		140	71 140	9999								ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	PHENANTHRENE	ug/L												ND	U	ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	PYRENE	ug/L		210	23 210									ND	U	ND	U	ND	U	ND	U		
SEMIVOLATILES	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1 2.1																	ND	U
SEMIVOLATILES	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2 25.2																	ND	U
SEMIVOLATILES	BNASIM	ACENAPHTHENE	ug/L		420	52 420																	ND	U
SEMIVOLATILES	BNASIM	ACENAPHTHYLENE	ug/L																				ND	U
SEMIVOLATILES	BNASIM	ANTHRACENE	ug/L		2100	34 2100																	ND	U
SEMIVOLATILES	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295 0.0048																	ND	U
SEMIVOLATILES	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295 0.0048																	ND	U
SEMIVOLATILES	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295 0.0048																	ND	U
SEMIVOLATILES	BNASIM	BENZO(GHI)PERYLENE	ug/L																				ND	U
SEMIVOLATILES	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295 0.0048																	ND	U
SEMIVOLATILES	BNASIM	CHRYSENE	ug/L		0.0048	2.95 0.0048																	ND	U
SEMIVOLATILES	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295 0.0048																	ND	U
SEMIVOLATILES	BNASIM	FLUORANTHENE	ug/L		280	21 280																	ND	U
SEMIVOLATILES	BNASIM	FLUORENE	ug/L		280	41 280																	ND	U
SEMIVOLATILES	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295 0.0048																	ND	U
SEMIVOLATILES	BNASIM	NAPHTHALENE	ug/L		140	71 140																	ND	U
SEMIVOLATILES	BNASIM	PHENANTHRENE	ug/L																				ND	U
SEMIVOLATILES	BNASIM	PYRENE	ug/L		210	23 210																	ND	U
SEMIVOLATILES	SW8270C	1-METHYL NAPHTHALENE	ug/L			2.1 2.1	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	2-METHYLNAPHTHALENE	ug/L			25.2 25.2	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	ACENAPHTHENE	ug/L		420	52 420	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	ACENAPHTHYLENE	ug/L				ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	ANTHRACENE	ug/L		2100	34 2100	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295 0.0048	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	BENZO(A)PYRENE	ug/L		0.0048	0.00295 0.0048	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295 0.0048	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	BENZO(GHI)PERYLENE	ug/L				ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295 0.0048	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	CHRYSENE	ug/L		0.0048	2.95 0.0048	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295 0.0048	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	FLUORANTHENE	ug/L		280	21 280	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	FLUORENE	ug/L		280	41 280	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295 0.0048	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	NAPHTHALENE	ug/L		140	71 140	ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	PHENANTHRENE	ug/L				ND	U	ND	U	ND	U	ND	U										
SEMIVOLATILES	SW8270C	PYRENE	ug/L		210	23 210	ND	U	ND	U	ND	U	ND	U										
VOLATILES	SW8260B	1,2-DIBROMOETHANE	ug/L				ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROETHANE	ug/L		0.38	0.636 0.38	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROPROPANE	ug/L		0.52	1.662 0.52	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	4-METHYL-2-PENTANONE (MIBK)	ug/L			959 959	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ACETONE	ug/L			16785 16785	2.99	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ANTHRACENE	ug/L		2100	34 2100																		
VOLATILES	SW8260B	BENZENE	ug/L		5	1.05 5	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	BROMOMETHANE	ug/L			16.2 16	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CARBON DISULFIDE	ug/L			228 228	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROFORM	ug/L		3.5	16 3.5	0.191	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROMETHANE	ug/L			4.8 4.8	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CIS-1,2-DICHLOROETHENE	ug/L		70	24 70	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ETHYL BENZENE	ug/L		700	89 700	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	IODOMETHANE	ug/L				ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYL ETHYL KETONE	ug/L			7098 7098	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYLENE CHLORIDE	ug/L		4.7	7.99 4.7	ND	U	ND	U	ND	U	ND	U	0.269	J	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	NAPHTHALENE	ug/L		140	71 140	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TETRACHLOROETHYLENE	ug/L		5	0.106 5	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TOLUENE	ug/L		560	132 560	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRANS-1,2-DICHLOROETHENE	ug/L		100	230 100	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRICHLOROETHENE	ug/L		5	0.142 5	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	VINYL CHLORIDE	ug/L		0.023	0.316 0.023	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	XYLENES, TOTAL	ug/L		10000	79 10000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Table 1
Analytes Detected In Groundwater
January 2010 through September 2011
SWMU 169
Fort Carson, Colorado

						Location Code			1206MW03		1206MW03		1206MW03		1206MW03		1206MW03		1206MW03		1206MW03		1206MW03		1206MW03		1206MW03	
						Sample No.			1206MW03-100111		1206MW03-100308		1206MW03-100311		1206MW03-100622		1206MW03-100921		1206MW03-100922		1206MW03-101222		1206MW03-110315		1206MW03-110317		1206MW03-110623		1206MW03-110921		DUP-01-100922	
						Sample Date			11-Jan-10		9-Mar-10		11-Mar-10		22-Jun-10		21-Sep-10		22-Sep-10		22-Dec-10		15-Mar-11		17-Mar-11		23-Jun-11		21-Sep-11		22-Sep-10	
				CGWS	CGWS	Sample Purpose			REG		REG		REG		REG				REG		REG		REG		REG		REG		REG		FD	
Test Group	METHOD	Parameter	Units	(AG)	(P)	RBC	PAL	BG	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
FIELD TESTS	D1498	OXIDATION-REDUCTION POTENTIAL	mV						13		20.2				69.9		78.3				-92.8		-35.5				103					
FIELD TESTS	E120.1	SPECIFIC CONDUCTIVITY	mS/cm						8.201		17.23				8.852		8.112				8.411		8.409				9.09					
FIELD TESTS	E150.1	PH	PH UNITS						6.86		5.76				7.35		6.86				7.02		6.81				9.42					
FIELD TESTS	E170.1	TEMPERATURE	C						14.3		11.92				13.2		17.18				16.17		12.77				14					
FIELD TESTS	E180.1	TURBIDITY	NTU						19.1		65.9				41.8		36				27.4		38				449					
FIELD TESTS	E360.1	DISSOLVED OXYGEN	mg/L						5.51		3.33				1.14		2.62				3.57		7.47				7.71					
SEMIVOLAT(SIM)	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1																		ND	U						
SEMIVOLAT(SIM)	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2																		ND	U						
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHENE	ug/L		420	52	420																		ND	U						
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHYLENE	ug/L																						ND	U						
SEMIVOLAT(SIM)	BNASIM	ANTHRACENE	ug/L		2100	34	2100																		ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048																		ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048																		ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048																		ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(GHI)PERYLENE	ug/L																						ND	U						
SEMIVOLAT(SIM)	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048																		ND	U						
SEMIVOLAT(SIM)	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048																		ND	U						
SEMIVOLAT(SIM)	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048																		ND	U						
SEMIVOLAT(SIM)	BNASIM	FLUORANTHENE	ug/L		280	21	280																		ND	U						
SEMIVOLAT(SIM)	BNASIM	FLUORENE	ug/L		280	41	280																		ND	U						
SEMIVOLAT(SIM)	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048																		ND	U						
SEMIVOLAT(SIM)	BNASIM	NAPHTHALENE	ug/L		140	71	140																		ND	U						
SEMIVOLAT(SIM)	BNASIM	PHENANTHRENE	ug/L																						ND	U						
SEMIVOLAT(SIM)	BNASIM	PYRENE	ug/L		210	23	210																		ND	U						
SEMIVOLATILES	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1																									
SEMIVOLATILES	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2																									
SEMIVOLATILES	BNASIM	ACENAPHTHENE	ug/L		420	52	420																									
SEMIVOLATILES	BNASIM	ACENAPHTHYLENE	ug/L																													
SEMIVOLATILES	BNASIM	ANTHRACENE	ug/L		2100	34	2100																									
SEMIVOLATILES	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048																									
SEMIVOLATILES	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048																									
SEMIVOLATILES	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048																									
SEMIVOLATILES	BNASIM	BENZO(GHI)PERYLENE	ug/L																													
SEMIVOLATILES	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048																									
SEMIVOLATILES	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048																									
SEMIVOLATILES	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048																									
SEMIVOLATILES	BNASIM	FLUORANTHENE	ug/L		280	21	280																									
SEMIVOLATILES	BNASIM	FLUORENE	ug/L		280	41	280																									
SEMIVOLATILES	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048																									
SEMIVOLATILES	BNASIM	NAPHTHALENE	ug/L		140	71	140																									
SEMIVOLATILES	BNASIM	PHENANTHRENE	ug/L																													
SEMIVOLATILES	BNASIM	PYRENE	ug/L		210	23	210																									
SEMIVOLATILES	SW8270C	1-METHYL NAPHTHALENE	ug/L			2.1	2.1		ND	U			ND	U	NC	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	2-METHYLNAPHTHALENE	ug/L			25.2	25.2		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	ACENAPHTHENE	ug/L		420	52	420		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	ACENAPHTHYLENE	ug/L						ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	ANTHRACENE	ug/L		2100	34	2100		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	BENZO(GHI)PERYLENE	ug/L						ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048		ND	U			ND	U	NC	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	CHRYSENE	ug/L		0.0048	2.95	0.0048		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048		ND	U			ND	U	NC	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	FLUORANTHENE	ug/L		280	21	280		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	FLUORENE	ug/L		280	41	280		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048		ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	NAPHTHALENE	ug/L		140	71	140		ND	U			0.044	J	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	PHENANTHRENE	ug/L						ND	U			ND	U	ND	U			ND	U											ND	U
SEMIVOLATILES	SW8270C	PYRENE	ug/L		210	23	210		ND	U			ND	U	ND	U			ND	U											ND	U
VOLATILES	SW8260B	1,2-DIBROMOETHANE	ug/L						ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROETHANE	ug/L		0.38	0.836	0.38		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROPROPANE	ug/L		0.52	1.682	0.52		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	4-METHYL-2-PENTANONE (MIBK)	ug/L			959	959		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	ACETONE	ug/L			10786	10786		ND	U	ND	U			NC	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	ANTHRACENE	ug/L		2100	34	2100																		ND	U						
VOLATILES	SW8260B	BENZENE	ug/L		5	1.05	5		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	BROMOMETHANE	ug/L			16.2	16		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	CARBON DISULFIDE	ug/L			226	226		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROFORM	ug/L		3.5	16	3.5		NC	U	NC	U			ND	U			ND	U	NC	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROMETHANE	ug/L			4.6	4.6		ND	U	NC	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	CIS-1,2-DICHLOROETHENE	ug/L		70	24	70		ND	U	NC	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	ETHYL BENZENE	ug/L		700	89	700		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	IODOMETHANE	ug/L						ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYL ETHYL KETONE	ug/L			7096	7096		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYLENE CHLORIDE	ug/L		4.7	7.99	4.7		ND	U	ND	U			ND	U			ND	U	0.371	J	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	NAPHTHALENE	ug/L		140	71	140		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	TETRACHLOROETHYLENE	ug/L		5	0.106	5		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	TOLUENE	ug/L		560	132	560		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRANS-1,2-DICHLOROETHENE	ug/L		100	230	100		NC	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRICHLOROETHENE	ug/L		5	0.142	5		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	VINYL CHLORIDE	ug/L		0.023	0.016	0.023		ND	U	ND	U			ND	U			ND	U	ND	U	ND	U			ND	U	ND	U	ND	U
VOLATILES	SW8260B	XYLENES, TOTAL	ug/L		10000	79	10000		NC	U	NC	U			ND	U			ND	U	NC	U	ND	U			ND	U	ND	U	ND	U

Table 1
Analytes Detected in Groundwater
January 2010 through September 2011
SWMU 169
Fort Carson, Colorado

							Location Code	1206MW07		1206MW07		1206MW07		1206MW07		1206MW07		1206MW07		1206MW07		1206MW07		1206MW07		1206MW07	
							Sample No.	1206MW07-100111		DUP-01-100111		1206MW07-100308		1206MW07-100621		DUP-01-100621		1206MW07-100922		1206MW07-101222		DUP-01-101222		1206MW07-110316		DUP-02-110316		1206MW07-110623		1206MW07-110920		DUP-01-110920	
							Sample Date	11-Jan-10		11-Jan-10		8-Mar-10		21-Jun-10		21-Jun-10		22-Sep-10		22-Dec-10		22-Dec-10		16-Mar-11		16-Mar-11		23-Jun-11		20-Sep-11		20-Sep-11	
				CGWS	CGWS		Sample Purpose	REG		FD		REG		REG		FD		REG		REG		FD		REG		FD		REG		REG		FD	
Test Group	METHOD	Parameter	Units	(AC)	(P)	RBC	PAL BG	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
FIELD TESTS	31498	OXIDATION-REDUCTION POTENTIAL	mV					-83.4				42.6		-119				-127.2		-141				-41.3				-141							
FIELD TESTS	E120.1	SPECIFIC CONDUCTIVITY	mS/cm					2.197				25.74		11.7				11.65		10.06				8.956				8.981							
FIELD TESTS	E150.1	PH	PH UNITS					6.73				12.81		7.88				7.3		7.62				7.47				7.51							
FIELD TESTS	E170.1	TEMPERATURE	C					12.97				11.45		13.31				16.96		14.69				11.9				13.64							
FIELD TESTS	E180.1	TURBIDITY	NTU					19.2				164.1		25				31		23				25.1				31							
FIELD TESTS	E360.1	DISSOLVED OXYGEN	mg/L					4.18				1.73		2.81				3.01		1.59				5.46				5.41							
SEMIVOLATILES	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1													2.26		3.87		2.2		2.25		1.42							
SEMIVOLATILES	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2													0.417		0.707		ND	U	ND	U	ND	U						
SEMIVOLATILES	BNASIM	ACENAPHTHENE	ug/L		420	52	420													4.8		7.56		5.65		5.92		6.84							
SEMIVOLATILES	BNASIM	ACENAPHTHYLENE	ug/L																	ND	U	ND	U	ND	U	ND	U	ND	U						
SEMIVOLATILES	BNASIM	ANTHRACENE	ug/L		2100	34	2100													1.09		2.06		1.92		1.89		1.17							
SEMIVOLATILES	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048													0.51		1.61		1.77		1.74		1.11							
SEMIVOLATILES	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048													0.207		0.709		0.772		0.673		0.35							
SEMIVOLATILES	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048													0.407		1.32		1.36		1.2		0.823							
SEMIVOLATILES	BNASIM	BENZO(GHI)PERYLENE	ug/L																	0.124		0.436		0.419		0.382		0.228							
SEMIVOLATILES	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048													0.283		0.945		1.15		1.06		0.685							
SEMIVOLATILES	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048													0.503		1.46		1.79		1.75		1.19							
SEMIVOLATILES	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048													0.0525		0.185		0.214		0.171		0.127							
SEMIVOLATILES	BNASIM	FLUORANTHENE	ug/L		280	21	280													3		7.15		7.67		8.18		5.48							
SEMIVOLATILES	BNASIM	FLUORENE	ug/L		280	41	280													3.56		5.63		3.82		3.93		3.2							
SEMIVOLATILES	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048													0.116		0.409		0.542		0.426		0.249							
SEMIVOLATILES	BNASIM	NAPHTHALENE	ug/L		140	71	140													0.715		1.38		ND	U	ND	U	ND	U						
SEMIVOLATILES	BNASIM	PHENANTHRENE	ug/L																	4.11		8.42		4.57		4.61		0.476							
SEMIVOLATILES	BNASIM	PYRENE	ug/L		210	23	210													2		4.81		4.73		4.49		3.55							
SEMIVOLATILES	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1																							1.04		0.337	J		
SEMIVOLATILES	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2																							ND	U	ND	U		
SEMIVOLATILES	BNASIM	ACENAPHTHENE	ug/L		420	52	420																							6.21		5.18			
SEMIVOLATILES	BNASIM	ACENAPHTHYLENE	ug/L																											ND	U	0.152			
SEMIVOLATILES	BNASIM	ANTHRACENE	ug/L		2100	34	2100																							1.1		0.617			
SEMIVOLATILES	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048																							0.901		1.41			
SEMIVOLATILES	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048																							0.313		0.472			
SEMIVOLATILES	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048																							0.682		1.07			
SEMIVOLATILES	BNASIM	BENZO(GHI)PERYLENE	ug/L																											0.173		0.283			
SEMIVOLATILES	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048																							0.49		0.856			
SEMIVOLATILES	BNASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048																							0.9		1.35			
SEMIVOLATILES	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048																							0.0842		0.136			
SEMIVOLATILES	BNASIM	FLUORANTHENE	ug/L		280	21	280																							5.35		6.35			
SEMIVOLATILES	BNASIM	FLUORENE	ug/L		280	41	280																							3.52		1.76			
SEMIVOLATILES	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048																							0.176		0.295			
SEMIVOLATILES	BNASIM	NAPHTHALENE	ug/L		140	71	140																							ND	U	ND	U		
SEMIVOLATILES	BNASIM	PHENANTHRENE	ug/L																											0.475		ND	U		
SEMIVOLATILES	BNASIM	PYRENE	ug/L		210	23	210																							3.62		4.52			
SEMIVOLATILES	SW8270C	1-METHYL NAPHTHALENE	ug/L			2.1	2.1	ND	U	ND	U	1.5		3.15		2.18		5.02																	
SEMIVOLATILES	SW8270C	2-METHYLNAPHTHALENE	ug/L			25.2	25.2	ND	U	ND	U	0.201	J	0.106	J	0.0639	J	0.654																	
SEMIVOLATILES	SW8270C	ACENAPHTHENE	ug/L		420	52	420		6.26		6.55		2.73		6.45		4.62		7.91															
SEMIVOLATILES	SW8270C	ACENAPHTHYLENE	ug/L					ND	U	ND	U	0.0397	J	ND	U	ND	U	ND	U																
SEMIVOLATILES	SW8270C	ANTHRACENE	ug/L		2100	34	2100		4.04		3.23		1.24		1.74		0.85		1.8															
SEMIVOLATILES	SW8270C	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048		3.38		2.16		1.3		3.43		0.733		1.03															
SEMIVOLATILES	SW8270C	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048		1.39		0.866		0.548		1.49		0.339		0.475															
SEMIVOLATILES	SW8270C	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048		1.47		0.995		1.93		3.26		0.789		0.809															
SEMIVOLATILES	SW8270C	BENZO(GHI)PERYLENE	ug/L						0.436	J	0.279	J	0.508		0.917		0.18		0.199															
SEMIVOLATILES	SW8270C	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048		1.48		0.774		1.12		1.94		0.385		0.746															
SEMIVOLATILES	SW8270C	CHRYSENE	ug/L		0.0048	2.95	0.0048		2.19		1.42		2.08		3.36		0.741		1.03															
SEMIVOLATILES	SW8270C	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048	ND	U	ND	U	0.222		0.33		0.0647	J	0.0743																	
SEMIVOLATILES	SW8270C	FLUORANTHENE	ug/L		280	21	280		10.5		7.43		4.75		11.3		3.4		4.75															
SEMIVOLATILES	SW8270C	FLUORENE	ug/L		280	41	280		3.71		3.58		1.83		4.71		3.12		6.05															
SEMIVOLATILES	SW8270C	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048		0.434	J	0.262	J	0.506		0.903		0.172		0.199															
SEMIVOLATILES	SW8270C	NAPHTHALENE	ug/L		140	71	140	ND	U	ND	U	4.04		5.63		3.95		4.23															
SEMIVOLATILES	SW8270C	PHENANTHRENE	ug/L						0.643		0.581		4.53		9.14		4.41		5.8															
SEMIVOLATILES	SW8270C	PYRENE	ug/L		210	23	210		6.3		5.91		3.74		6.9		2.83		4.06															
VOLATILES	SW8260B	1,2-DIBROMOETHANE	ug/L					ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	1,2-DICHLOROETHANE	ug/L		0.38	0.636	0.38	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	1,2-DICHLOROPROPANE	ug/L		0.52	1.682	0.52	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	4-METHYL-2-PENTANONE (MIBK)	ug/L			959	959	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	2.64	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	ACETONE	ug/L			10786	10786	9	J	5.67	J	274		111		102		101		20		18.9		19		ND	U	41.8		20.2		22.5			
VOLATILES	SW8260B	ANTHRACENE	ug/L		2100	34	2100																											
VOLATILES	SW8260B	BENZENE	ug/L		5	1.05	5	5.98		6.01		3.72		3.72		3.62		5.06		4.62		4.77		4.04		4.48		3.72		4.55		4.54			
VOLATILES	SW8260B	BROMOMETHANE	ug/L			16.2	16	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	CARBON DISULFIDE	ug/L			226	226	ND	U	ND	U	11		3.77		4.31		ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	CHLOROFORM	ug/L		3.5	16	3.5	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	1.06		ND	U	ND	U	NC	U		
VOLATILES	SW8260B	CHLOROMETHANE	ug/L			4.6	4.6	ND	U	ND	U	0.551	J	NC	U	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	CIS-1,2-DICHLOROETHENE	ug/L		70	24	70	0.623	J	0.625	J	2.08		2.01		1.86		2.98		2		2.04		1.48		1.57		1.19		1.55		1.4			
VOLATILES	SW8260B	ETHYL BENZENE	ug/L		700	83	700	5.42		5.47		15.2		27.8		25.6		29.5		26.3		28.8		19.2		21.5		14.4		16.7		16.1			
VOLATILES	SW8260B	IODOMETHANE	ug/L					ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	METHYL ETHYL KETONE	ug/L			7098	7098	ND	U	ND	U	61.8		20.9		21.5		26.4		ND	U	ND	U	8.75	J	3.93	J	14.8		ND	U	ND	U		
VOLATILES	SW8260B	METHYLENE CHLORIDE	ug/L		4.7	7.99	4.7	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U	0.262	J	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	NAPHTHALENE	ug/L		140	71	140	0.75	J	0.79	J	13.6		13.2		13.2		11.5		1.88		1.96		1.92		1.48		1.45		1.24		1.36			
VOLATILES	SW8260B	TETRACHLOROETHYLENE	ug/L		5	0.106	5	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	TOLUENE	ug/L		560	132	560	0.723	J	0.775	J	0.505	J	0.547	J	0.51	J	0.437	J	0.371	J	0.394	J	0.537	J	0.553	J	0.427	J	0.455	J	0.452	J		
VOLATILES	SW8260B	TRANS-1,2-DICHLOROETHENE	ug/L		100	230	100	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	TRICHLOROETHENE	ug/L		5	0.142	5	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U		
VOLATILES	SW8260B	VINYL CHLORIDE	ug/L		0.023	0.018	0.023	33.5		32.2		3.58		5.87		5.1		7.38		6.98		7.28		5.29		7.23		5.53		5.95		5.61			
VOLATILES	SW8260B	XYLENES, TOTAL	ug/L		10000	79	10000	ND	U	ND	U	1.03	J	1.1	J	1.02	J	ND	U	ND	U	ND	U	1.39	J	1.67		1.65		ND	U	ND	U		

Table 1
Analytes Detected in Groundwater
January 2010 through September 2011
SWMU 169
Fort Carson, Colorado

						Location Code	1206MW08		1206MW08		1206MW08		1206MW08		1206MW08		1206MW08		1206MW08		1206MW08	
						Sample No.	1206MW08-100111		1206MW08-100308		1206MW08-100521		1206MW08-100922		1206MW08-101222		1206MW08-110316		1206MW08-110623		1206MW08-110920	
						Sample Date	11-Jan-10		8-Mar-10		21-Jun-10		22-Sep-10		22-Dec-10		16-Mar-11		23-Jun-11		20-Sep-11	
				CGWS	CGWS	Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG	
Test Group	METHOD	Parameter	Units	(AG)	(P)	RBC PAL BG	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
FIELD TESTS	E7.498	OXIDATION-REDUCTION POTENTIAL	mV				-60.1		80.3		11		-60.3		-143		-30.8		-100			
FIELD TESTS	E120.1	SPECIFIC CONDUCTIVITY	mS/cm				2.819		17.75		3.478		2.719		2.78		3.822		3.98			
FIELD TESTS	E150.1	PH	PH UNITS				6.58		6.79		7.29		6.99		7.3		6.15		6.64			
FIELD TESTS	E170.1	TEMPERATURE	C				13.56		11.91		13.1		16.54		14.94		12.81		13.48			
FIELD TESTS	E180.1	TURBIDITY	NTU				16.7		41.5		23		41		21		15.1		21			
FIELD TESTS	E360.1	DISSOLVED OXYGEN	mg/L				3.12		2.88		3.1		1.83		3.71		5.26		8.59			
SEMIVOLAT(SIM)	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1 2.1									48.7		61.5		13.4			
SEMIVOLAT(SIM)	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2 25.2									3.57		7.74		ND	U		
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHENE	ug/L		420	52 420									14.3		7.26		2.3			
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHYLENE	ug/L												ND	U	ND	U	ND	U		
SEMIVOLAT(SIM)	BNASIM	ANTHRACENE	ug/L		2100	34 2100									8.72		17		4.26			
SEMIVOLAT(SIM)	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295 0.0048									10.8		21.2		5.62			
SEMIVOLAT(SIM)	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295 0.0048									5.74		11.7		2.86			
SEMIVOLAT(SIM)	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295 0.0048									5.72		9.88		3.02			
SEMIVOLAT(SIM)	BNASIM	BENZO(GHI)PERYLENE	ug/L												2.67		3.88		1.35			
SEMIVOLAT(SIM)	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295 0.0048									5.32		8.57		2.92			
SEMIVOLAT(SIM)	BNASIM	CHRYSENE	ug/L		0.0048	2.95 0.0048									8.82		17.7		4.95			
SEMIVOLAT(SIM)	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295 0.0048									1.19		1.83		0.535			
SEMIVOLAT(SIM)	BNASIM	FLUORANTHENE	ug/L		280	21 280									30		57.1		15.8			
SEMIVOLAT(SIM)	BNASIM	FLUORENE	ug/L		280	41 280									15.9		15.5		3.48			
SEMIVOLAT(SIM)	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295 0.0048									2.49		3.98		1.33			
SEMIVOLAT(SIM)	BNASIM	NAPHTHALENE	ug/L		140	71 140									12.8		14.5		3.74			
SEMIVOLAT(SIM)	BNASIM	PHENANTHRENE	ug/L												38.3		68.9		5.71			
SEMIVOLAT(SIM)	BNASIM	PYRENE	ug/L		210	23 210									24.4		42		12.6			
SEMIVOLATILES	BNASIM	1-METHYL NAPHTHALENE	ug/L			2.1 2.1															48.7	E
SEMIVOLATILES	BNASIM	2-METHYLNAPHTHALENE	ug/L			25.2 25.2															ND	U
SEMIVOLATILES	BNASIM	ACENAPHTHENE	ug/L		420	52 420															10.7	
SEMIVOLATILES	BNASIM	ACENAPHTHYLENE	ug/L																		0.608	
SEMIVOLATILES	BNASIM	ANTHRACENE	ug/L		2100	34 2100															6.49	
SEMIVOLATILES	BNASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295 0.0048															6.73	
SEMIVOLATILES	BNASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295 0.0048															3.57	
SEMIVOLATILES	BNASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295 0.0048															3.68	
SEMIVOLATILES	BNASIM	BENZO(GHI)PERYLENE	ug/L																		1.6	
SEMIVOLATILES	BNASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295 0.0048															3.31	
SEMIVOLATILES	BNASIM	CHRYSENE	ug/L		0.0048	2.95 0.0048															5.37	
SEMIVOLATILES	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295 0.0048															0.742	
SEMIVOLATILES	BNASIM	FLUORANTHENE	ug/L		280	21 280															17.4	E
SEMIVOLATILES	BNASIM	FLUORENE	ug/L		280	41 280															12.9	
SEMIVOLATILES	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295 0.0048															1.48	
SEMIVOLATILES	BNASIM	NAPHTHALENE	ug/L		140	71 140															19	E
SEMIVOLATILES	BNASIM	PHENANTHRENE	ug/L																		26.5	E
SEMIVOLATILES	BNASIM	PYRENE	ug/L		210	23 210															14.8	E
SEMIVOLATILES	SW8270C	1-METHYL NAPHTHALENE	ug/L			2.1 2.1	0.638		46.4		44.9		61.1									
SEMIVOLATILES	SW8270C	2-METHYLNAPHTHALENE	ug/L			25.2 25.2	ND	U	10.8		7.35		3.22									
SEMIVOLATILES	SW8270C	ACENAPHTHENE	ug/L		420	52 420	0.498	J	6.61		8.91		14.1									
SEMIVOLATILES	SW8270C	ACENAPHTHYLENE	ug/L				ND	U	0.434		ND	U	ND	U								
SEMIVOLATILES	SW8270C	ANTHRACENE	ug/L		2100	34 2100	0.541		5.89		8.44		13.7									
SEMIVOLATILES	SW8270C	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295 0.0048	0.64		8.42		11.9		14.7									
SEMIVOLATILES	SW8270C	BENZO(A)PYRENE	ug/L		0.0048	0.00295 0.0048	0.362	J	4.52		6.14		6.42									
SEMIVOLATILES	SW8270C	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295 0.0048	0.39	J	5.27		6.65		6.43									
SEMIVOLATILES	SW8270C	BENZO(GHI)PERYLENE	ug/L				ND	U	2.08		2.8		2.63									
SEMIVOLATILES	SW8270C	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295 0.0048	0.332	J	3.95		5.37		6.07									
SEMIVOLATILES	SW8270C	CHRYSENE	ug/L		0.0048	2.95 0.0048	0.576		8.67		8.93		12.2									
SEMIVOLATILES	SW8270C	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295 0.0048	ND	U	1.01		1.32		1.11									
SEMIVOLATILES	SW8270C	FLUORANTHENE	ug/L		280	21 280	1.68		28.5		32		41.4									
SEMIVOLATILES	SW8270C	FLUORENE	ug/L		280	41 280	0.563		9.2		12.3		14.4									
SEMIVOLATILES	SW8270C	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295 0.0048	ND	U	1.98		2.66		2.54									
SEMIVOLATILES	SW8270C	NAPHTHALENE	ug/L		140	71 140	ND	U	22.9		14.8		18									
SEMIVOLATILES	SW8270C	PHENANTHRENE	ug/L				1.02		44		37.7		39.7									
SEMIVOLATILES	SW8270C	PYRENE	ug/L		210	23 210	1.6		23.8		25.9		34.4									
VOLATILES	SW8260B	1,2-DIBROMOETHANE	ug/L				ND	U	ND	U	ND	U	0.25	J	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROETHANE	ug/L		0.38	0.638 0.38	0.903	J	ND	U	ND	U	0.925	J	ND	U	0.818	J	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROPROPANE	ug/L		0.52	1.662 0.52	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	4-METHYL-2-PENTANONE (MIBK)	ug/L			959 959	ND	U	2.76	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ACETONE	ug/L			10786 10786	3.75	J	132		14.9		ND	U	ND	U	28.4		10.4		6.89	J
VOLATILES	SW8260B	ANTHRACENE	ug/L		2100	34 2100																
VOLATILES	SW8260B	BENZENE	ug/L		5	1.05 5	1.05		13.7	M	8.52		8.09		9.49		4.82		4.92		3.16	
VOLATILES	SW8260B	BROMOMETHANE	ug/L			16.2 16	NC	U	0.535	J	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U
VOLATILES	SW8260B	CARBON DISULFIDE	ug/L			226 226	ND	U	31.9	M	1.66		ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROFORM	ug/L		3.5	16 3.5	ND	U	ND	U	ND	U	NC	U	ND	U	NC	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROMETHANE	ug/L			4.6 4.6	ND	U	ND	U	ND	U	NC	U	ND	U	NC	U	ND	U	ND	U
VOLATILES	SW8260B	CIS-1,2-DICHLOROETHENE	ug/L		70	24 70	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U
VOLATILES	SW8260B	ETHYL BENZENE	ug/L		700	88 700	4.84		63.9	M	47.3		40.2		42.5		22.7		36.1		27.6	
VOLATILES	SW8260B	IODOMETHANE	ug/L				ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U
VOLATILES	SW8260B	METHYL ETHYL KETONE	ug/L			7098 7098	ND	U	ND	U	ND	U	NC	U	ND	U	7	U	ND	U	ND	U
VOLATILES	SW8260B	METHYLENE CHLORIDE	ug/L		4.7	7.99 4.7	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U
VOLATILES	SW8260B	NAPHTHALENE	ug/L		140	71 140	1.18		46.5		21.6		22.2		42.1		23.6		38.5		49.8	
VOLATILES	SW8260B	TETRACHLOROETHYLENE	ug/L		5	0.106 5	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TOLUENE	ug/L		560	132 560	NC	U	3.67		2.1		1.95		2.2	J	1.21		2.26		1.64	
VOLATILES	SW8260B	TRANS-1,2-DICHLOROETHENE	ug/L		100	230 100	NC	U	NC	U	ND	U	ND	U	ND	U	NC	U	ND	U	ND	U
VOLATILES	SW8260B	TRICHLOROETHENE	ug/L		5	0.142 5	ND	U	ND	U	ND	U	NC	U	ND	U	NC	U	ND	U	ND	U
VOLATILES	SW8260B	VINYL CHLORIDE	ug/L		0.023	0.016 0.023	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	XYLENES, TOTAL	ug/L		10000	79 10000	ND	U	11.9	M	8.35		5.48		13		7.12		17.6		15.8	

Table 1
Analytes Detected in Groundwater
January 2010 through September 2011
SWMU 169
Fort Carson, Colorado

							Location Code	1206MW09		1206MW09		1206MW09	1206MW09	1206MW09	1206MW09	1206MW09	
							Sample No.	1206MW09-100112		1206MW09-100309		1206MW09-100622	1206MW09-100922	1206MW09-101222	1206MW09-110624	1206MW09-110921	
							Sample Date	12-Jan-10		9-Mar-10		22-Jun-10	22-Sep-10	22-Dec-10	24-Jun-11	21-Sep-11	
				CGWS	CGWS	Sample Purpose		REG		REG		REG	REG	REG	REG	REG	
Test Group	METHOD	Parameter	Units	(AG)	(P)	RBC	PAL	BG	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
FIELD TESTS	D1498	OXIDATION-REDUCTION POTENTIAL	mV						102.7		115.7		180		-61.8		-180.4		-114			
FIELD TESTS	E120.1	SPECIFIC CONDUCTIVITY	mS/cm						5.03		10.23		5.463		5.99		5.513		5.566			
FIELD TESTS	E150.1	PH	PH UNITS						7		6.74		7.02		6.84		7.11		7.17			
FIELD TESTS	E170.1	TEMPERATURE	C						13.34		10.22		13.15		17.59		15.76		14.87			
FIELD TESTS	E180.1	TURBIDITY	NTU						1287		1330		714		191		193		471			
FIELD TESTS	E360.1	DISSOLVED OXYGEN	mg/L						6.24		4.95		1.89		3.22		3.78		6.31			
SEMIVOLAT(SIM)	BNASIM	1-METHYL NAPHTHALENE	ug/L				2.1	2.1														
SEMIVOLAT(SIM)	BNASIM	2-METHYLNAPHTHALENE	ug/L				25.2	25.2														
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHENE	ug/L			420	52	420														
SEMIVOLAT(SIM)	BNASIM	ACENAPHTHYLENE	ug/L																			
SEMIVOLAT(SIM)	BNASIM	ANTHRACENE	ug/L			2100	34	2100														
SEMIVOLAT(SIM)	BNASIM	BENZO(A)ANTHRACENE	ug/L			0.0048	0.0295	0.0048														
SEMIVOLAT(SIM)	BNASIM	BENZO(A)PYRENE	ug/L			0.0048	0.00295	0.0048														
SEMIVOLAT(SIM)	BNASIM	BENZO(B)FLUORANTHENE	ug/L			0.0048	0.0295	0.0048														
SEMIVOLAT(SIM)	BNASIM	BENZO(GHI)PERYLENE	ug/L																			
SEMIVOLAT(SIM)	BNASIM	BENZO(K)FLUORANTHENE	ug/L			0.0048	0.295	0.0048														
SEMIVOLAT(SIM)	BNASIM	CHRYSENE	ug/L			0.0048	2.95	0.0048														
SEMIVOLAT(SIM)	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L			0.0048	0.00295	0.0048														
SEMIVOLAT(SIM)	BNASIM	FLUORANTHENE	ug/L			280	21	280														
SEMIVOLAT(SIM)	BNASIM	FLUORENE	ug/L			280	41	280														
SEMIVOLAT(SIM)	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L			0.0048	0.0295	0.0048														
SEMIVOLAT(SIM)	BNASIM	NAPHTHALENE	ug/L			140	71	140														
SEMIVOLAT(SIM)	BNASIM	PHENANTHRENE	ug/L																			
SEMIVOLAT(SIM)	BNASIM	PYRENE	ug/L			210	23	210														
SEMIVOLATILES	BNASIM	1-METHYL NAPHTHALENE	ug/L				2.1	2.1													ND	U
SEMIVOLATILES	BNASIM	2-METHYLNAPHTHALENE	ug/L				25.2	25.2													ND	U
SEMIVOLATILES	BNASIM	ACENAPHTHENE	ug/L			420	52	420													ND	U
SEMIVOLATILES	BNASIM	ACENAPHTHYLENE	ug/L																		ND	U
SEMIVOLATILES	BNASIM	ANTHRACENE	ug/L			2100	34	2100													ND	U
SEMIVOLATILES	BNASIM	BENZO(A)ANTHRACENE	ug/L			0.0048	0.0295	0.0048													ND	U
SEMIVOLATILES	BNASIM	BENZO(A)PYRENE	ug/L			0.0048	0.00295	0.0048													ND	U
SEMIVOLATILES	BNASIM	BENZO(B)FLUORANTHENE	ug/L			0.0048	0.0295	0.0048													ND	U
SEMIVOLATILES	BNASIM	BENZO(GHI)PERYLENE	ug/L																		ND	U
SEMIVOLATILES	BNASIM	BENZO(K)FLUORANTHENE	ug/L			0.0048	0.295	0.0048													NC	U
SEMIVOLATILES	BNASIM	CHRYSENE	ug/L			0.0048	2.95	0.0048													NC	U
SEMIVOLATILES	BNASIM	DIBENZ(A,H)ANTHRACENE	ug/L			0.0048	0.00295	0.0048													ND	U
SEMIVOLATILES	BNASIM	FLUORANTHENE	ug/L			280	21	280													ND	U
SEMIVOLATILES	BNASIM	FLUORENE	ug/L			280	41	280													ND	U
SEMIVOLATILES	BNASIM	INDENO(1,2,3-CD)PYRENE	ug/L			0.0048	0.0295	0.0048													ND	U
SEMIVOLATILES	BNASIM	NAPHTHALENE	ug/L			140	71	140													ND	U
SEMIVOLATILES	BNASIM	PHENANTHRENE	ug/L																		NC	U
SEMIVOLATILES	BNASIM	PYRENE	ug/L			210	23	210													ND	U
SEMIVOLATILES	SW8270C	1-METHYL NAPHTHALENE	ug/L				2.1	2.1	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	2-METHYLNAPHTHALENE	ug/L				25.2	25.2	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	ACENAPHTHENE	ug/L			420	52	420	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	ACENAPHTHYLENE	ug/L						ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	ANTHRACENE	ug/L			2100	34	2100	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	BENZO(A)ANTHRACENE	ug/L			0.0048	0.0295	0.0048	NC	U			NC	U	0.062	J						
SEMIVOLATILES	SW8270C	BENZO(A)PYRENE	ug/L			0.0048	0.00295	0.0048	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	BENZO(B)FLUORANTHENE	ug/L			0.0048	0.0295	0.0048	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	BENZO(GHI)PERYLENE	ug/L						ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	BENZO(K)FLUORANTHENE	ug/L			0.0048	0.295	0.0048	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	CHRYSENE	ug/L			0.0048	2.95	0.0048	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	DIBENZ(A,H)ANTHRACENE	ug/L			0.0048	0.00295	0.0048	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	FLUORANTHENE	ug/L			280	21	280	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	FLUORENE	ug/L			280	41	280	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	INDENO(1,2,3-CD)PYRENE	ug/L			0.0048	0.0295	0.0048	ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	NAPHTHALENE	ug/L			140	71	140	ND	U			NC	U	ND	U						
SEMIVOLATILES	SW8270C	PHENANTHRENE	ug/L						ND	U			ND	U	ND	U						
SEMIVOLATILES	SW8270C	PYRENE	ug/L			210	23	210	ND	U			ND	U	ND	U						
VOLATILES	SW8260B	1,2-DIBROMOETHANE	ug/L						ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROETHANE	ug/L			0.38	0.636	0.38		1.47		0.889 J		1.15		1.46		1.8		1.8		1.39
VOLATILES	SW8260B	1,2-DICHLOROPROPANE	ug/L			0.52	1.682	0.52	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	4-METHYL-2-PENTANONE (MIBK)	ug/L				959	959	ND	U	NC	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	ACETONE	ug/L				10786	10786		2.82 J		3.04 J	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	ANTHRACENE	ug/L			2100	34	2100														
VOLATILES	SW8260B	BENZENE	ug/L			5	1.05	5	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	BROMOMETHANE	ug/L				16.2	16	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	CARBON DISULFIDE	ug/L				226	226	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	CHLOROFORM	ug/L			3.5	16	3.5	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	CHLOROMETHANE	ug/L				4.8	4.8	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	CIS-1,2-DICHLOROETHENE	ug/L			70	24	70		9.09	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	ETHYL BENZENE	ug/L			700	89	700	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	ND	U
VOLATILES	SW8260B	IODOMETHANE	ug/L						ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	NC	U
VOLATILES	SW8260B	METHYL ETHYL KETONE	ug/L				7098	7098	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	NC	U	NC	U
VOLATILES	SW8260B	METHYLENE CHLORIDE	ug/L			4.7	7.98	4.7	ND	U	ND	U	ND	U	ND	U		0.34 J	ND	U	ND	U	ND	U
VOLATILES	SW8260B	NAPHTHALENE	ug/L			140	71	140	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TETRACHLOROETHYLENE	ug/L			5	0.106	5		0.861 J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TOLUENE	ug/L			560	132	560	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRANS-1,2-DICHLOROETHENE	ug/L			100	230	100		0.424 J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRICHLOROETHENE	ug/L			5	0.142	5		2.46	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	VINYL CHLORIDE	ug/L			0.023	0.016	0.023	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	XYLENES, TOTAL	ug/L			10000	79	10000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Table 1
Analytes Detected in Groundwater
January 2010 through September 2011
SWMU 169
Fort Carson, Colorado

							Location Code	1206MW10		1206MW10		1206MW10		1206MW10		1206MW10		1206MW10		1206MW10		1206MW10		1206MW10	
							Sample No.	1206MW10-100112		1206MW10-100114		1206MW10-100308		1206MW10-100309		1206MW10-100622		1206MW10-100922		1206MW10-101222		1206MW10-110316		1206MW10-110623		1206MW10-110921	
							Sample Date	12-Jan-10		14-Jan-10		8-Mar-10		9-Mar-10		22-Jun-10		22-Sep-10		22-Dec-10		16-Mar-11		23-Jun-11		21-Sep-11	
							Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Test Group	METHOD	Parameter	Units	CGWS (AG)	CGWS (P)	RBC	PAL	BG	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
FIELD TESTS	D'498	OXIDATION-REDUCTION POTENTIAL	mV						140.6				-44.1				185.9		199.1		-66		-31		257			
FIELD TESTS	E120.1	SPECIFIC CONDUCTIVITY	mS/cm						5.571				15.26				8.421		9.118		8.124		4.24		6.153			
FIELD TESTS	E150.1	PH	PH UNITS						7.27				7.26				7.68		7.3		7.18		7.57		6.14			
FIELD TESTS	E170.1	TEMPERATURE	C						13.5				10.52				14.21		19.16		15.9		11.14		14.12			
FIELD TESTS	E180.1	TURBIDITY	NTU						261.6				173.8				241		92		51		9.8		3.3			
FIELD TESTS	E360.1	DISSOLVED OXYGEN	mg/L						7.18				5.61				2.35		2.39		5.77		11.02		7.6			
SEMIVOLAT(SIM)	8NASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1														ND	U						
SEMIVOLAT(SIM)	8NASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2														ND	U						
SEMIVOLAT(SIM)	8NASIM	ACENAPHTHENE	ug/L		420	52	420														ND	U						
SEMIVOLAT(SIM)	8NASIM	ACENAPHTHYLENE	ug/L																		ND	U						
SEMIVOLAT(SIM)	8NASIM	ANTHRACENE	ug/L		2100	34	2100														ND	U						
SEMIVOLAT(SIM)	8NASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048														ND	U						
SEMIVOLAT(SIM)	8NASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048														ND	U						
SEMIVOLAT(SIM)	8NASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048														ND	U						
SEMIVOLAT(SIM)	8NASIM	BENZO(GHI)PERYLENE	ug/L																		ND	U						
SEMIVOLAT(SIM)	8NASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048														ND	U						
SEMIVOLAT(SIM)	8NASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048														ND	U						
SEMIVOLAT(SIM)	8NASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048														ND	U						
SEMIVOLAT(SIM)	8NASIM	FLUORANTHENE	ug/L		280	21	280														ND	U						
SEMIVOLAT(SIM)	8NASIM	FLUORENE	ug/L		280	41	280														ND	U						
SEMIVOLAT(SIM)	8NASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048														ND	U						
SEMIVOLAT(SIM)	8NASIM	NAPHTHALENE	ug/L		140	71	140														ND	U						
SEMIVOLAT(SIM)	8NASIM	PHENANTHRENE	ug/L																		ND	U						
SEMIVOLAT(SIM)	8NASIM	PYRENE	ug/L		210	23	210														ND	U						
SEMIVOLATILES	8NASIM	1-METHYL NAPHTHALENE	ug/L			2.1	2.1																				ND	U
SEMIVOLATILES	8NASIM	2-METHYLNAPHTHALENE	ug/L			25.2	25.2																				ND	U
SEMIVOLATILES	8NASIM	ACENAPHTHENE	ug/L		420	52	420																				ND	U
SEMIVOLATILES	8NASIM	ACENAPHTHYLENE	ug/L																								ND	U
SEMIVOLATILES	8NASIM	ANTHRACENE	ug/L		2100	34	2100																				ND	U
SEMIVOLATILES	8NASIM	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048																				ND	U
SEMIVOLATILES	8NASIM	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048																				ND	U
SEMIVOLATILES	8NASIM	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048																				ND	U
SEMIVOLATILES	8NASIM	BENZO(GHI)PERYLENE	ug/L																								ND	U
SEMIVOLATILES	8NASIM	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048																				ND	U
SEMIVOLATILES	8NASIM	CHRYSENE	ug/L		0.0048	2.95	0.0048																				ND	U
SEMIVOLATILES	8NASIM	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048																				ND	U
SEMIVOLATILES	8NASIM	FLUORANTHENE	ug/L		280	21	280																				ND	U
SEMIVOLATILES	8NASIM	FLUORENE	ug/L		280	41	280																				ND	U
SEMIVOLATILES	8NASIM	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048																				ND	U
SEMIVOLATILES	8NASIM	NAPHTHALENE	ug/L		140	71	140																				ND	U
SEMIVOLATILES	8NASIM	PHENANTHRENE	ug/L																								ND	U
SEMIVOLATILES	8NASIM	PYRENE	ug/L		210	23	210																				ND	U
SEMIVOLATILES	SW8270C	1-METHYL NAPHTHALENE	ug/L			2.1	2.1				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	2-METHYLNAPHTHALENE	ug/L			25.2	25.2				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	ACENAPHTHENE	ug/L		420	52	420				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	ACENAPHTHYLENE	ug/L								ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	ANTHRACENE	ug/L		2100	34	2100				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(A)ANTHRACENE	ug/L		0.0048	0.0295	0.0048				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(A)PYRENE	ug/L		0.0048	0.00295	0.0048				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(B)FLUORANTHENE	ug/L		0.0048	0.0295	0.0048				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(GHI)PERYLENE	ug/L								ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	BENZO(K)FLUORANTHENE	ug/L		0.0048	0.295	0.0048				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	CHRYSENE	ug/L		0.0048	2.95	0.0048				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	DIBENZ(A,H)ANTHRACENE	ug/L		0.0048	0.00295	0.0048				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	FLUORANTHENE	ug/L		280	21	280				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	FLUORENE	ug/L		280	41	280				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	INDENO(1,2,3-CD)PYRENE	ug/L		0.0048	0.0295	0.0048				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	NAPHTHALENE	ug/L		140	71	140				ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	PHENANTHRENE	ug/L								ND	U			ND	U	ND	U	ND	U								
SEMIVOLATILES	SW8270C	PYRENE	ug/L		210	23	210				ND	U			ND	U	ND	U	ND	U								
VOLATILES	SW8260B	1,2-DIBROMOETHANE	ug/L						ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	1,2-DICHLOROETHANE	ug/L		0.38	0.636	0.38		636				739				389		387		361		344		302		273	
VOLATILES	SW8260B	1,2-DICHLOROPROPANE	ug/L		0.52	1.682	0.52		7.79				8.48				3.93		4.95		4		3.85		3.53		2.33	
VOLATILES	SW8260B	4-METHYL-2-PENTANONE (MIBK)	ug/L			959	959		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ACETONE	ug/L			10786	10786		3.27	J			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ANTHRACENE	ug/L		2100	34	2100																					
VOLATILES	SW8260B	BENZENE	ug/L		5	7.05	5		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	BROMOMETHANE	ug/L			16.2	16		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CARBON DISULFIDE	ug/L			226	226		ND	U			ND	U			22.5		ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CHLOROFORM	ug/L		3.5	16	3.5		2.07				2.19	J			0.94	J	0.989	J	0.516	J	0.686	J	0.554	J	0.376	J
VOLATILES	SW8260B	CHLOROMETHANE	ug/L			4.6	4.6		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	CIS-1,2-DICHLOROETHENE	ug/L		70	24	70		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	ETHYL BENZENE	ug/L		700	89	700		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	IODOMETHANE	ug/L						ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYL ETHYL KETONE	ug/L			7098	7098		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	METHYLENE CHLORIDE	ug/L		4.7	7.99	4.7		ND	U			ND	U			ND	U	ND	U	0.785	J	ND	U	ND	U	ND	U
VOLATILES	SW8260B	NAPHTHALENE	ug/L		140	71	140		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TETRACHLOROETHYLENE	ug/L		5	0.106	5		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TOLUENE	ug/L		560	132	560		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRANS-1,2-DICHLOROETHENE	ug/L		100	230	100		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	TRICHLOROETHENE	ug/L		5	0.142	5		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	VINYL CHLORIDE	ug/L		0.023	0.016	0.023		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
VOLATILES	SW8260B	XYLENES, TOTAL	ug/L		10000	78	10000		ND	U			ND	U			ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Table 1
Analytes Detected in Groundwater
January 2010 through September 2011
SWMU 169
Fort Carson, Colorado

Bolded values indicate an exceedance of the Fort Carson background concentration.
Gray shaded values indicate exceedance of the associated project action limit.
(AG) denotes agricultural.
B denotes lab qualifier; the analyte is present in method blank.
BG denotes background.
CGWS (AG) denotes Colorado Groundwater Standard (agricultural).
CGWS (P) denotes Colorado Groundwater Standard (primary).
J denotes estimated; the analyte was positively identified; the concentration is estimated.
ng/L denotes nanograms per liter.
ND denotes nondetect.
(P) denotes primary.
PAL denotes project action limit.
Q denotes lab qualifier; one or more quality control criteria failed.
Qual denotes laboratory qualifier.
RBC denotes risk-based concentration.
REG denotes regular.
U denotes not detected; the compound/analyte was analyzed for, but not detected above the associated reporting limit.
Validation qualifiers, detection limits, dilution factors, and complete results are presented in Appendix C.